MACWORLD

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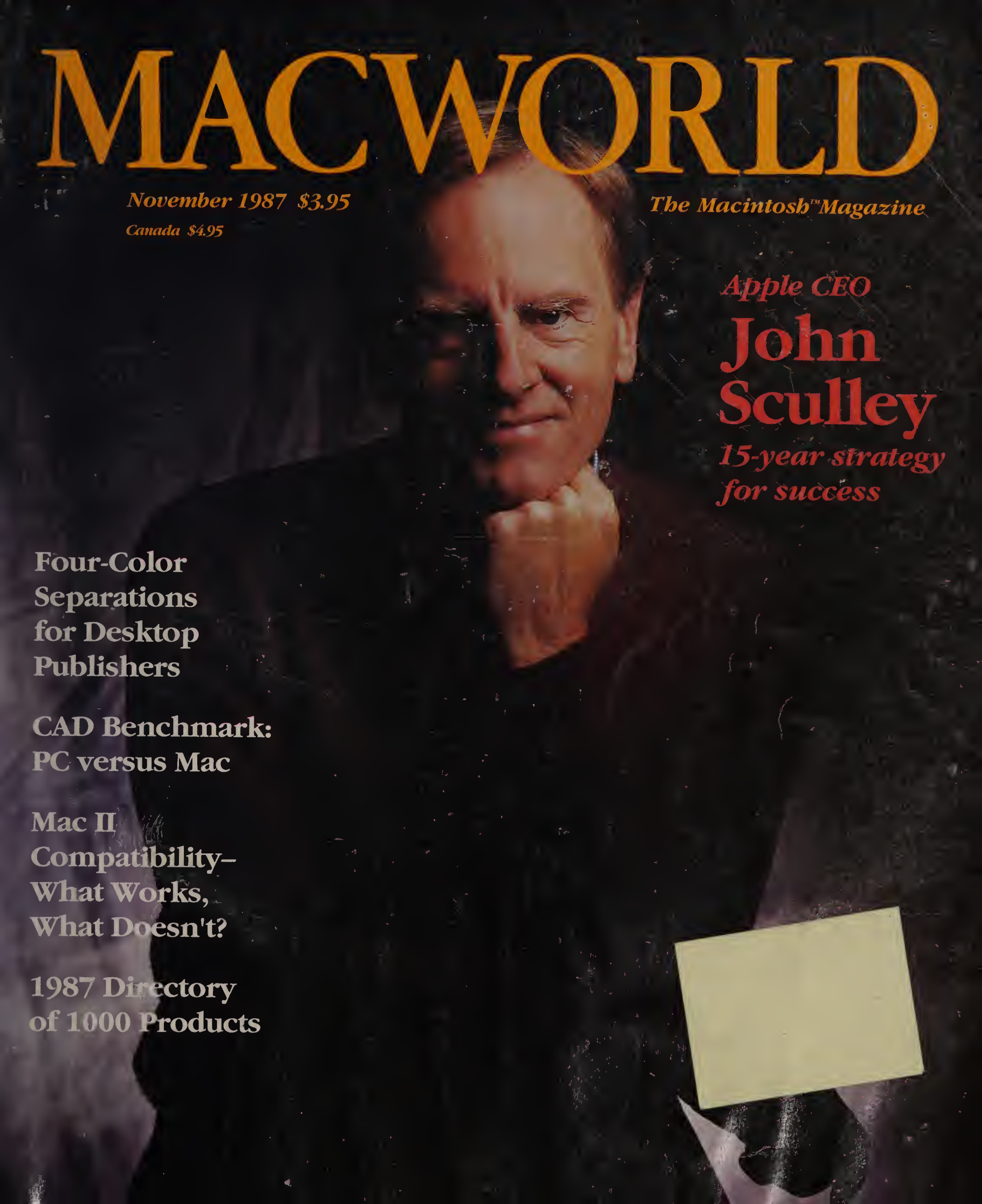
The Macintosh™ Magazine



Apple CEO John Sculley

15-year strategy for success

Four-Color Separations for Desktop Publishers

CAD Benchmark: PC versus Mac

Mac II Compatibility– What Works, What Doesn't?

1987 Directory of 1000 Products

Nothing gets the jobs done

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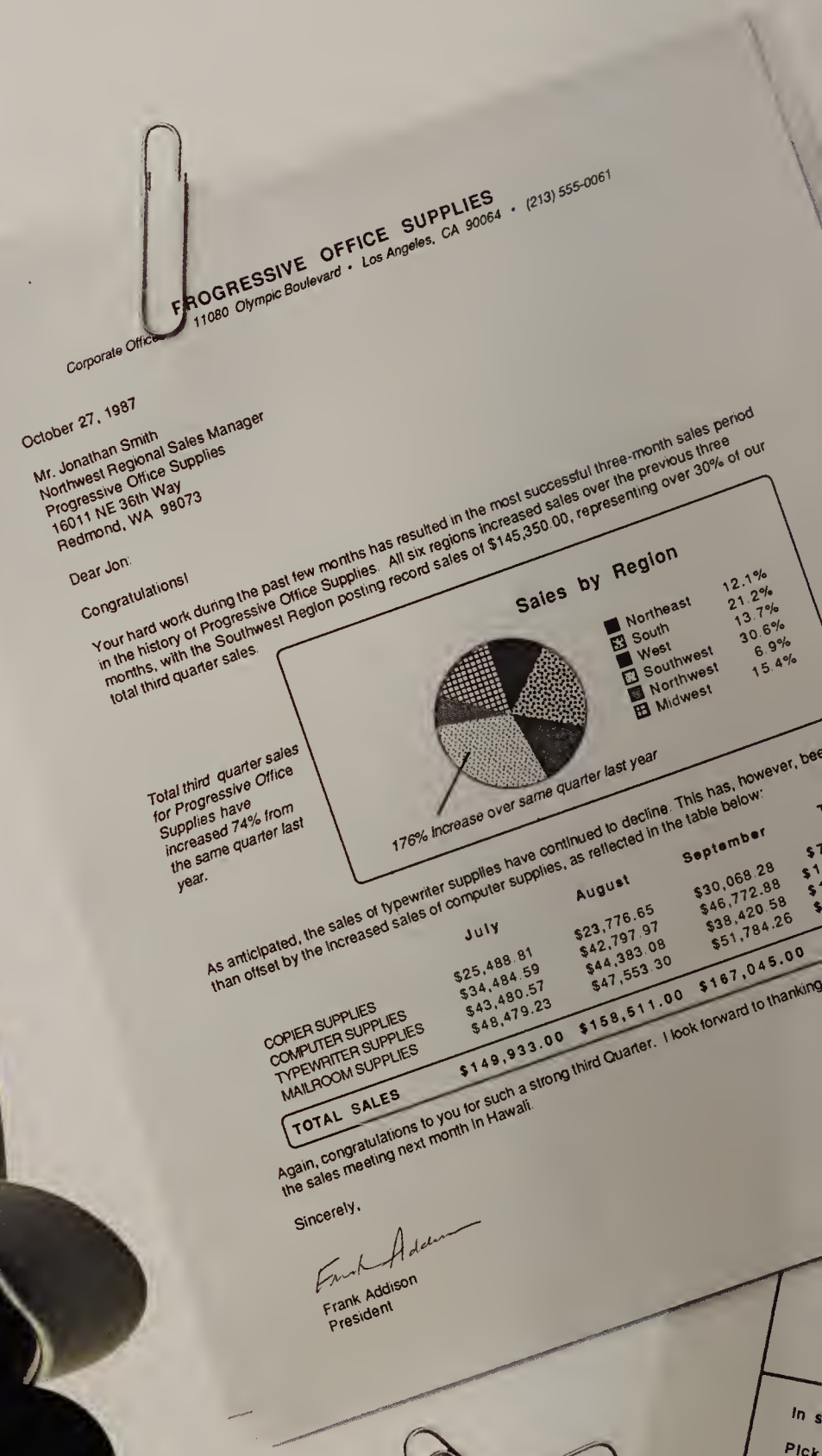

like Microsoft Works.

from one to another. And later combine work done in each part of the program on a single printed page.

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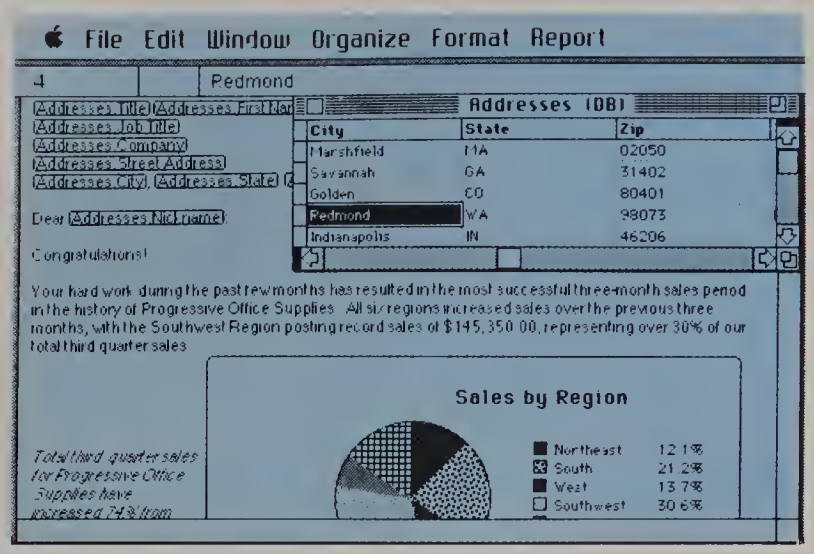

written in the word processor.)

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All in all, Microsoft Works is a superb solution for day to day, get-it-done problems—an inspiring display of convenience, efficiency, and utility.

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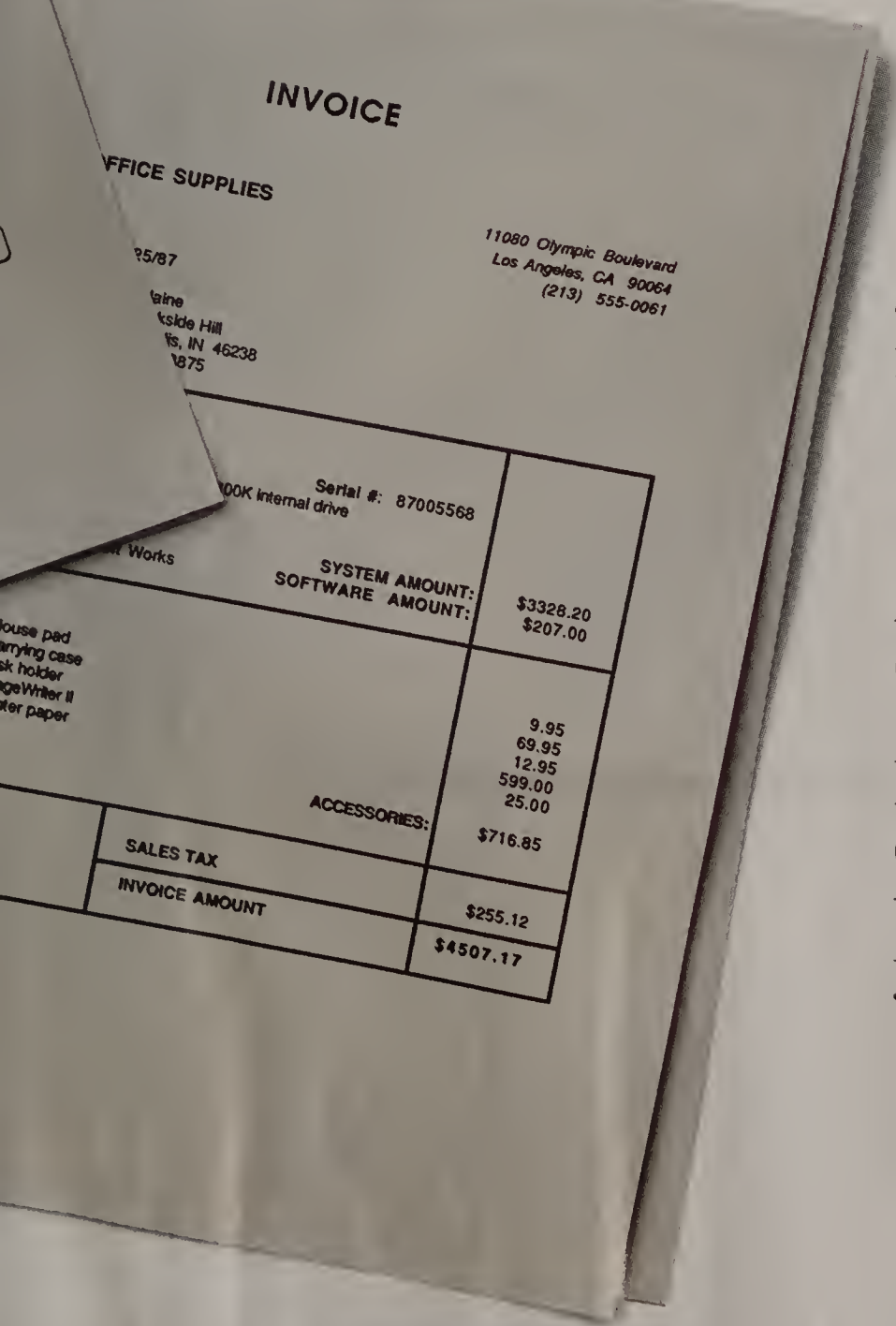

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MACWORLD

November 1987

The Macintosh ™ Magazine

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A man with plans: Apple chairman John Sculley discusses his vision of Apple in the twenty-first century. See p. 73 (Photo by Cynthia Moore.)

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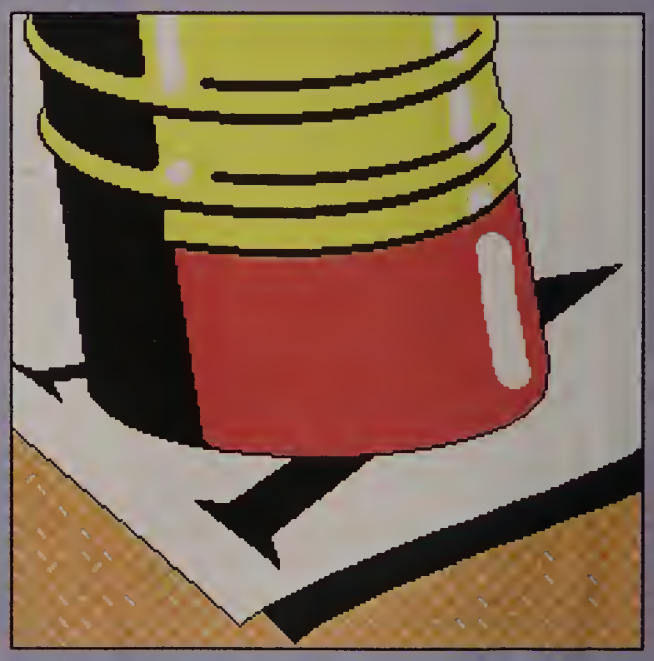

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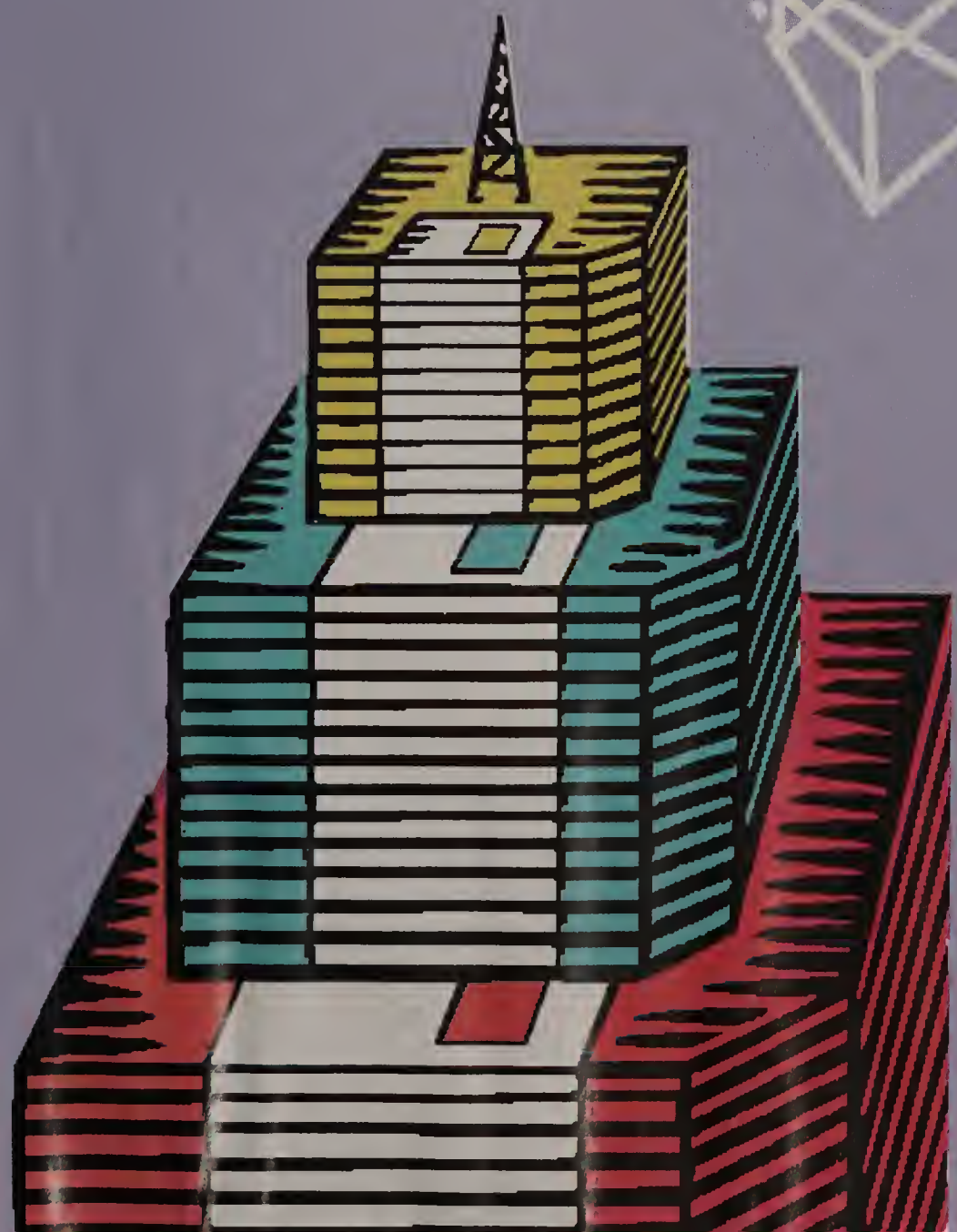

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"Mom laughs a lot. She says it makes her happy to see us happy. Mothers go for that kind of stuff.

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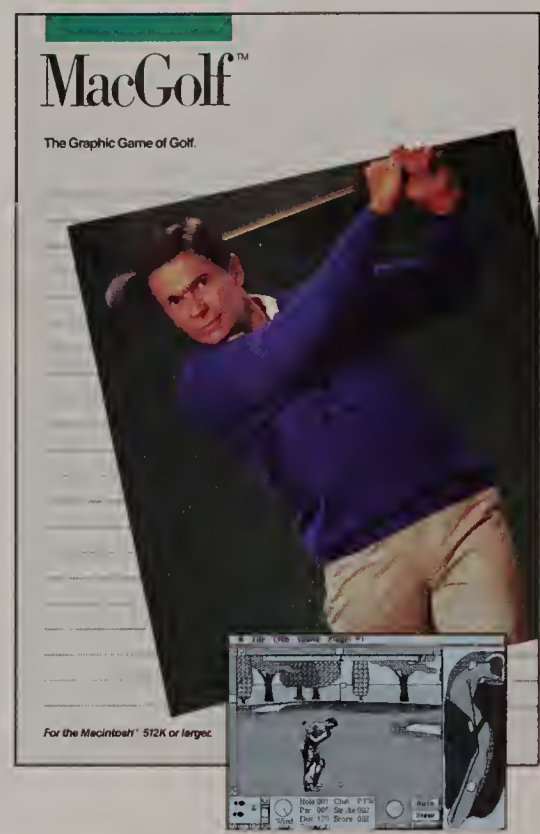
MacRacquetball turns your Macintosh screen into a full perspective 3-D display of court, players and ball. With the mouse, you have complete control of player position, ball placement, ball speed and shots. Two people can play the same game over AppleTalk® or modem.

Superb graphics give MacRacquetball completely convincing realism. There are more than 1000 frames of ultra high speed digitized animation. It's one racquetball court that's always open when you're ready to play.



Enthusiastic players everywhere have made MacGolf the best selling Macintosh game ever.

MacGolf puts you in the picture, a full perspective 3-D simulation of realistic golf action. You match your skills against fairways, roughs, bunkers, water hazards, sand traps and trees.

MacGolf gives you a player's eye view of the course, in any direction, and an aerial overview of each hole. You have complete control of your position, ball placement, ball speed and direction, and selection of all 14 clubs. Digitized graphics and sounds add to the excitement.

MacGolf is so close to the real thing it will improve your golf game. And by the time you've reached the eighteenth hole you'll know you've been in a real contest.

When you have the best selling Macintosh game in the world, what do you do for an encore?

Here's new turf for adventurous MacGolfers. These are courses to conquer for mouse wielding pros who have taken the measure of the original MacGolf courses.

If you liked MacGolf, you'll love what MacCourses brings to the screen. Four new 18 hole, par 72 courses: Cedar Creek, Golden Sands, Thunder Ridge and PCAI International. The fairways, traps, hazards, and putting greens of MacCourses are in a whole new league.

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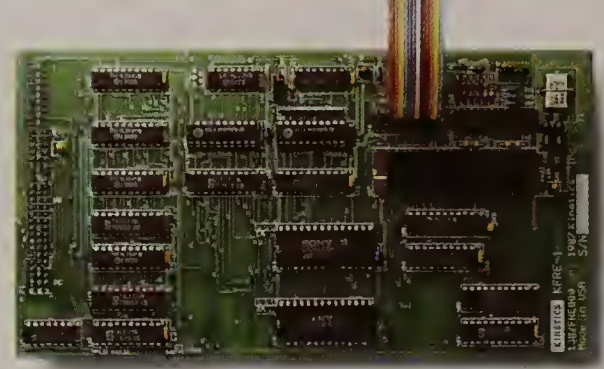
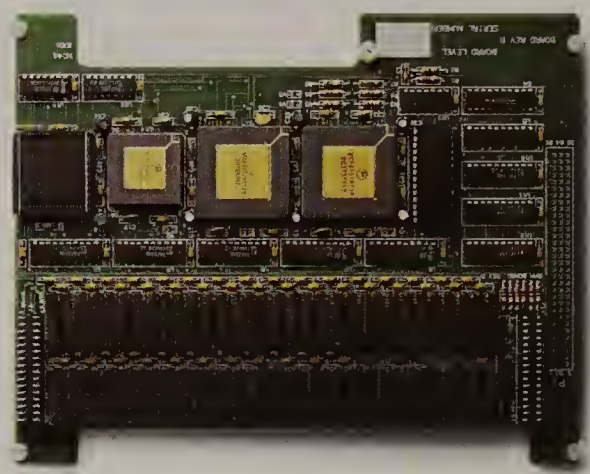
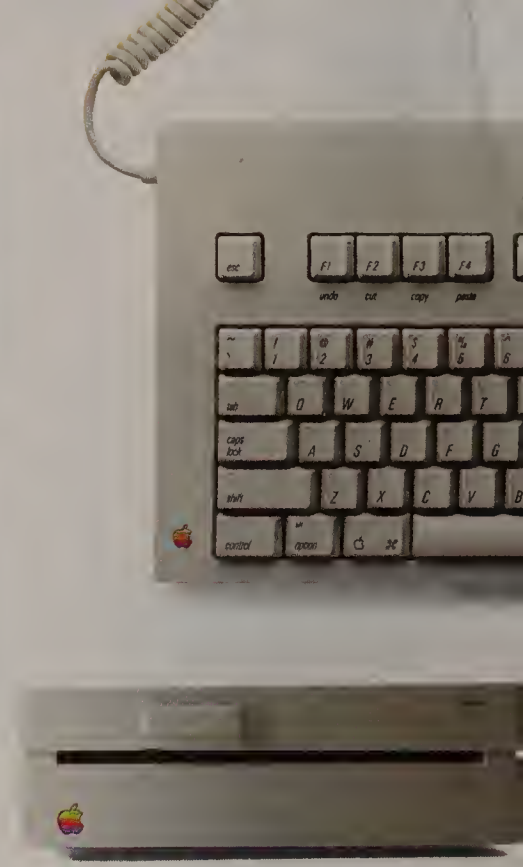
Macintosh SE. The perfect place to start building–equipped with a built-in 20MByte hard disk (or a second internal floppy) and one internal expansion slot.



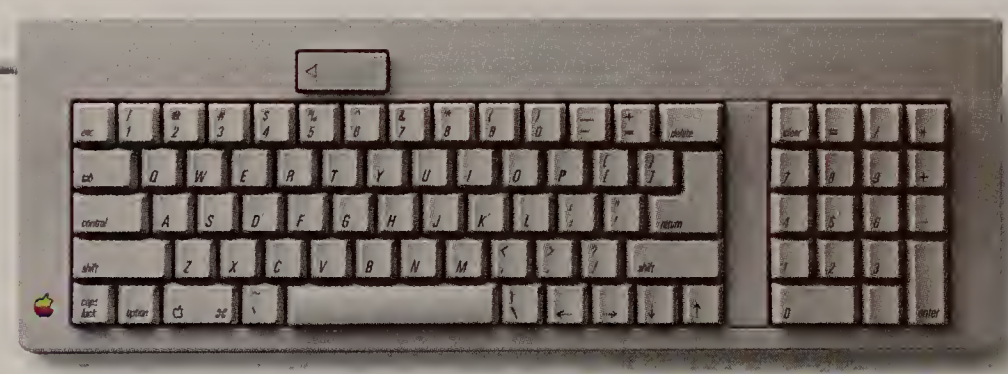
Plug a card into the SE and make a quick connection with mainframes and networks.



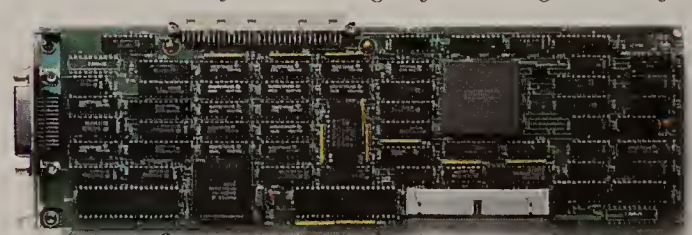
Floor it. In a Macintosh SE, a 68020 accelerator card gives you license to exceed the speed limit.



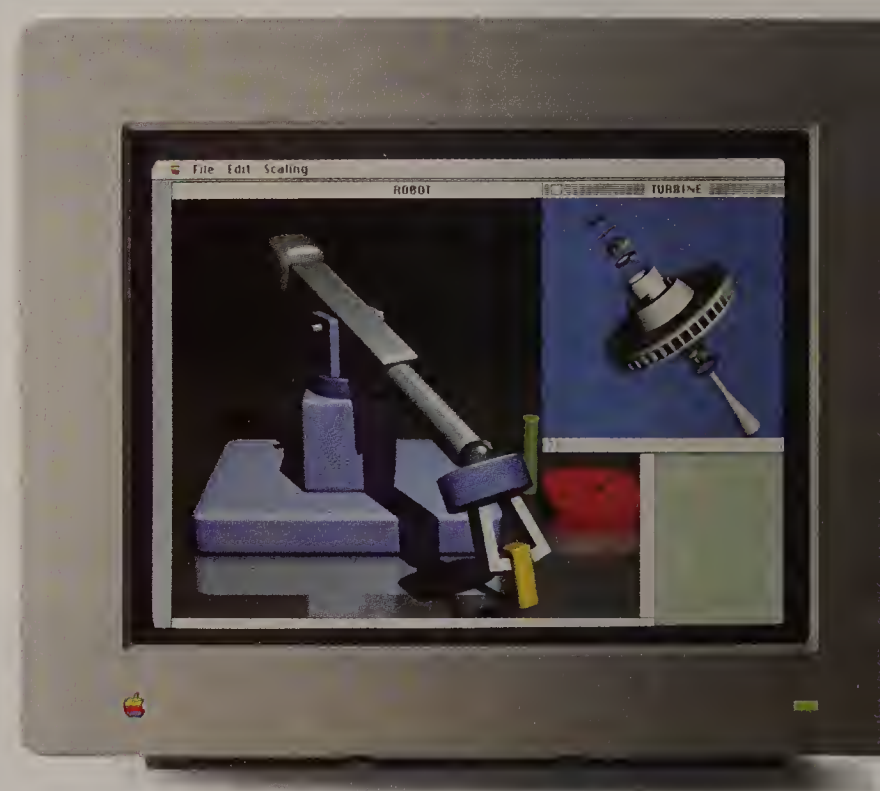
Add a 5.25" disk drive, and (with the right card) you can use information created on IBM or compatible PCs. Or run MS-DOS programs.



A new keyboard, re-designed for the new generation of Macintosh computers.



In scientific or engineering applications, a special card can connect an SE or a II to lab instruments.



The new AppleColor™ High-Resolution RGB monitor can create brilliant hues and true gray scale on your Macintosh II. In finely-detailed 640 x 480 pixel resolution. Also available: a 12" monochrome monitor.

How to build your

You've heard about them. You've read about them. By now, you've probably even seen them.

Our latest leaps in technology, the new Macintosh™ SE and Macintosh II personal computers, have been getting their share of press.

But to add to what you may already know, we'd like to tell you more about their most powerful feature: expandability.

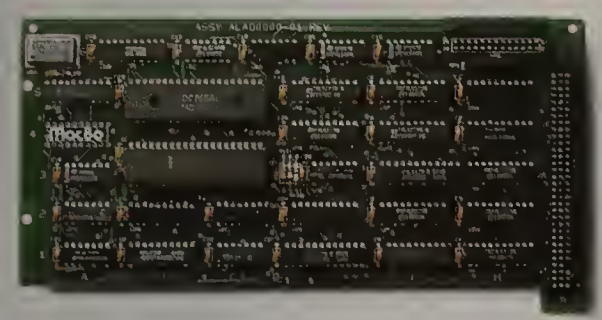
It's something we made possible by adding expansion slots. So you can easily customize your Macintosh to meet the demands of any business.

You can, for example, set up a system that's perfect for major-league number crunching. Or add features to give you even greater power for Apple Desktop Publishing, like displays as big as 21 inches.

The SE sports one expansion slot. While the Macintosh II takes the idea of expansion to the extreme–with six 32-bit NuBus slots. Which have the good sense to configure themselves, and require you to do nothing more than plug in the options of your choice.

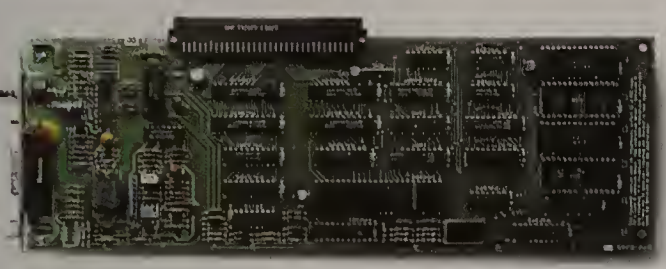
Such as an 80286 co-processor card that lets you run programs written for MS-DOS computers. And a video card that produces near-photographic images

Presenting the Apple Extended Keyboard. Complete with 15 programmable function keys, as well as separate cursor and numeric keypads.



Via the expansion slots, you can add an AST co-processor card to either the SE or Macintosh II.

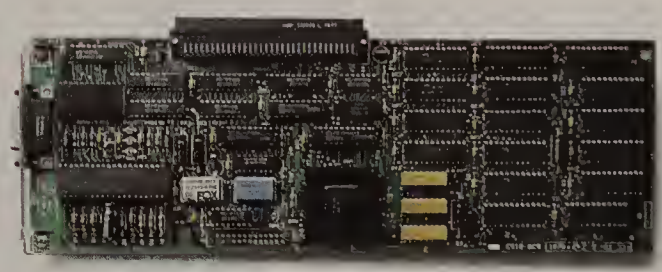
With either the SE or the II, a large-screen monitor (available from other manufacturers) can give you the big picture. And show you up to two pages at once.



Using one of the II's six slots, you can tie into the company mainframe or an office network like Ethernet.

If you lose it, you can't use it. The Apple Tape Backup 40SC safeguards the work on your hard disk. Pronto.

Build yourself a power station. The Macintosh II has a lightning-fast 32-bit Motorola 68020 processor, a 68881 co-processor and six NuBus expansion slots.



The Macintosh II Video Card can generate colors 256 at a time, at up to eight bits per pixel. Using a palette of over 16 million colors.

own Macintosh.

from a palette of over 16 million colors.

The new Macintosh computers are built to be customized in other ways, too.

You can set up your SE with up to four megabytes of memory, so it has the power to run the most sophisticated programs. And configure the II with up to eight megabytes of memory on the main board, or a walloping 1.5 gigabytes using the expansion slots.

As for storage, there's plenty. With either computer, you get the option of an internal hard disk. Or an external one that can store up to 80 megabytes.

You can also choose between two keyboards. One of which has 15 function keys that come in handy when delving into special applications.

And as you might expect, we've done more than just give you a very good way to build the Macintosh of your dreams.

We've also arranged to make sure you have the perfect workshop: an authorized Apple® dealer.*

Where you can get some expert assistance choosing your options.

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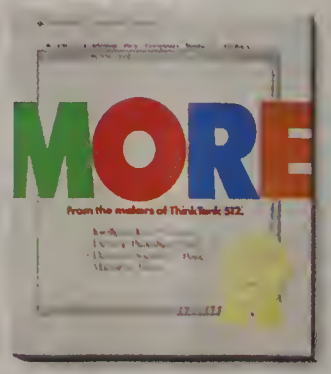

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It's the Future, and It's Free

▶ If you launch the program on the free Mac disk from General Motors' Buick Division, you'll see a cross section of a motor "run" right on your Mac's screen–at a speed usually reserved for movies.

This animated advertisement, for which General Motors has received over 60,000 orders, also features a moving suspension and a rotating supercharger. Other portions of the interactive program, which is called a Soft Ad, respond to your choices by suggesting which Buick model will best meet your needs.

Soft Ads have been jointly developed by SoftAd and Beck-Tech, which also markets an animation program called *MacMovies* that lets Macintosh users create "movies" using *MacDraw, Easy3D,* and *MacPaint.* (Images can also be created using a video camera or VCR.) The frames can be sequenced, resequenced, played back, and strung together to make longer movies.

Until recently, this "desktop television" technology was available only on systems costing $100,000 or more. But the Macintosh–especially the Mac II–will be used extensively for such applications as preparing video programs and commercials.

Is there a future for Soft Ads or desktop television? See for yourself by ordering the free Buick Dimension disk. Call 800/87-BUICK between 8 a.m. and 5 p.m., EST.

Printer Magic

▶ Orange Micro is offering a $99 printer cable, called the Grappler, that it says will connect the Macintosh to almost any parallel printer–without a change in software. This means many well-known printers, such as Epson, Okidata, and Panasonic, can emulate an Apple ImageWriter II (including color printing on many printer models).

The Grappler converts Mac serial output into the parallel input of many dot matrix printers, using circuitry contained in an enlarged connector head that plugs into the printer. The cable also works with the Apple IIc or IIGS, and it comes with a one-year warranty.

Backup, the EasyWay

▶ Most of us tend to have an unjustified faith in the invincibility of electronic equipment, despite the fact that just about every Macintosh user has experienced some kind of hardware or software indigestion. When the machine on your desk fails and all those files on your hard disk become inaccessible, what's the next step? Reliable tape drives and automatic network backup utilities sound like just the ticket. But though they're in sight, they're probably not going to be available for a while. In the meantime? Why, (groan) it's back to backing up on floppies.

Without the help of some kind of utility, managing regular backup with measly 800K floppy disks becomes a monumental task when you're talking about 20- to 300MB hard disks. Fortunately, there's a program called *DiskFit* 1.3 from SuperMac Software that performs documents-only and incremental backups. Back up your System Folder and applications using the normal Mac copy function, and then use *DiskFit* to back up your documents on a daily or weekly basis. It's a back-up strategy that's easy to manage.

DiskFit 1.3 is available from SuperMac for $74.95; a network version costs $395.

PC Experience Pays Off

▶ Tecmar is taking advantage of its expertise as a leader in tape backup systems for the MS-DOS world. It has released the *QT-Mac40* 40MB tape backup, which relies on the QIC-100 recording standard for high-level error correction.

Tecmar's new Apple Products Division has a series of other products under development, including an expansion chassis for the SE and the Mac II. This external box will provide extra slots and thus the ability to install additional floppy drives, hard disks, and tape backup systems. Tecmar plans to supply graphics and multifunction boards for the new machines, as well as boards dedicated to scientific data acquisition and industrial control and monitoring. Tecmar expects Mac IIs to be used in growing numbers in the latter two areas.

Common Problems

▶ BMUG (Berkeley Macintosh User Group) members call the group's hotline several hundred times a week. Volunteer consultants find that 80 to 90 percent of the calls touch on the same 20 or so questions.

Right now they're getting calls from Macintosh SE owners who find their computer isn't working correctly after they've copied a number of disks to their internal hard drive. Many of those disks contain uninstalled Systems and Finders that can unexpectedly take over from the startup System. The solution is to go into a disk that's going to be copied to the internal hard disk and select only documents that don't contain a System or Finder.

BMUG also urges its callers to attempt to solve their file problems with a shareware program called *FileFixer,* which corrects many HFS difficulties. A copy of *FileFixer* can be found on many bulletin boards and in user group libraries.

Protecting Your Files

▶ Over half the Macintoshes now sold are used in situations where files are sensitive or confidential. Protecting Mac documents can be difficult, since a file can often be downloaded from a computer or network in just seconds.

To solve this problem, SuperMac's *Sentinel* program

(continues)

quickly encrypts files using an algorithm that makes deciphering very difficult, if not impossible. Even if a document does go astray, the scrambling makes it virtually useless.

Sentinel encrypts files individually or in sets. One password locks or unlocks the files. Locked files appear as locked icons on the desktop. For more information, call SuperMac in Mountain View, California, at 415/964-8884.

Goodbye, Mac 512KE

▶ Apple has quietly ceased manufacturing the Macintosh 512KE. Not even a press release marked the passing of the once-heralded enhanced version of the 512K, which was introduced in April 1986.

The decision was prompted by diminished demand, following the introduction of the SE.

Many of the 512KE's features –such as a 124K operating system, 800K internal drive, and SCSI port–are still included in the 1MB Mac Plus, which now becomes Apple's entry-level Macintosh computer.

Your Best Stacks

▶ Send a disk of your best *HyperCard* stacks to: News Editor, *Macworld,* 501 Second St., San Francisco, CA 94107. We'll pay $25 for every entry selected for a new monthly item, "Your Best Stacks." Please tell us how you developed your stack, describe its features and who would use it, and let us know how readers can obtain more information. We'll also need to know if it's free, shareware, or a commercial product.

The Big Apple

▶ Look for Macintosh computers to act more and more like minis and mainframes. Their high-end capabilities will come after Apple introduces its UNIX-like operating system, *A/UX,* and the upgraded software that will follow.

One of these potential products is *Sybase,* a high-volume, high-performance relational database that now works on networked workstations from DEC and Sun Microsystems. A Mac version of *Sybase* would allow Macintosh software developers to design databases that run on the kind of extensive distributed networks typically found in large corporations and government agencies.

The likelihood of such a Mac database was recently heightened by Apple's minority investment in Sybase of Berkeley, California.

Servant Documentation

▶ Although Apple has finally released MultiFinder, many Macintosh enthusiasts may still want to use its precursor. After all, *Servant* requires less memory, allows you to switch instantly from one application to another, performs desktop tasks faster and more conveniently–and it's free through user groups and bulletin boards.

New documentation about *Servant*'s 56 features is now available from writer Scott Kronick of Berkeley, California. The 92-page manual includes four tutorial chapters and a reference chapter that indexes features by screen shots and by topic.

Interspersed throughout are comments from *Servant* author Andy Hertzfeld, who talks about how the program works and what makes it fun. For instance, Hertzfeld wrote *Servant* in such a way that any *MacPaint* or ThunderScan document could become the background for the desktop. More functional features include automatic printing of multiple documents, shrinking or expanding the size of icons, creating custom icons, speaking the names of files, and displaying how memory is utilized.

To obtain a copy of *Servant: A New Shell for the Macintosh,* send a $10 check or money order to Scott Kronick, 1442-A Walnut St. #278, Berkeley, CA 94709.

PageMaker for User Groups

▶ Aldus Corporation offers its *PageMaker* desktop publishing programs and services at reduced rates for qualifying Macintosh user groups.

Groups can purchase a single copy of *PageMaker* 2.0a for $100 instead of the full $495 retail price. Along with product discounts, qualified user groups can enroll in Aldus's Extended Technical Support Service, which includes free upgrades and five hours of technical support through a toll-free 800 number. Groups will also receive Aldus's bimonthly customer newsletter, *The Desktop Publisher,* and quarterly technical journal, *The Aldus File.*

To qualify your group, send a copy of your newsletter, a letter on the group's letterhead ordering the Macintosh version of *PageMaker* 2.0a, and a check for $100. Send to: Aldus Customer Relations, 411 First Ave. S #200, Seattle, WA 98104. For more information call 206/628-2320.

AppleLinking Everyone?

▶ Apple dealers and Macintosh user groups have had access to an easy-to-use E-mail and bulletin board system in the form of Apple's own *AppleLink,* which offers icons and menus just like other Macintosh programs.

But for the rest of us, life on the phone lines hasn't been so easy. We've often been overloaded by having to remember commands, pick default settings, and go through a whole bunch of other DOS-like incongruities.

Now we can have simplicity in communications through a new program called *Desktop Express,* which was jointly developed by Dow Jones, Apple Computer, and MCI Mail.

Desktop Express offers icons and pull-down menus, transmission of both text and graphics, offline creation and answering of E-mail, an address book, and integration with the electronic mail functions of MCI Mail (which also offers hard-copy deliveries for people who don't have computers).

Trade-ins for Color Monitors

▶ Swamped with orders for its new AppleColor high-resolution RGB monitor, Apple has instituted a 90-day "please be patient" program. Owners of Mac II monochrome monitors purchased before October 31, 1987, can exchange them for new color monitors. In order to receive full credit toward the purchase of a color monitor, your monochrome monitor must be turned in to an Apple-authorized dealer between January 1 and March 31, 1988. □

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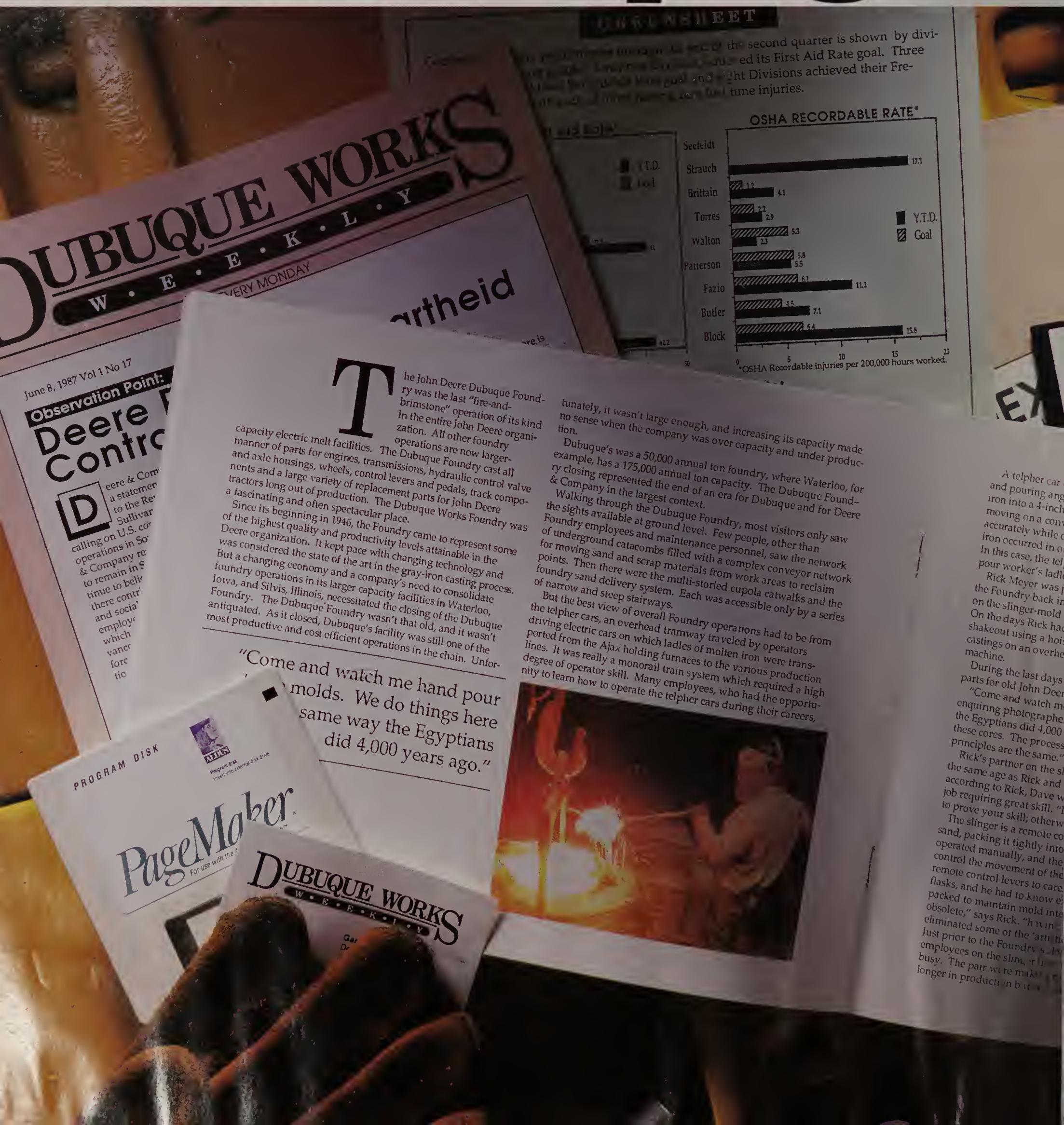

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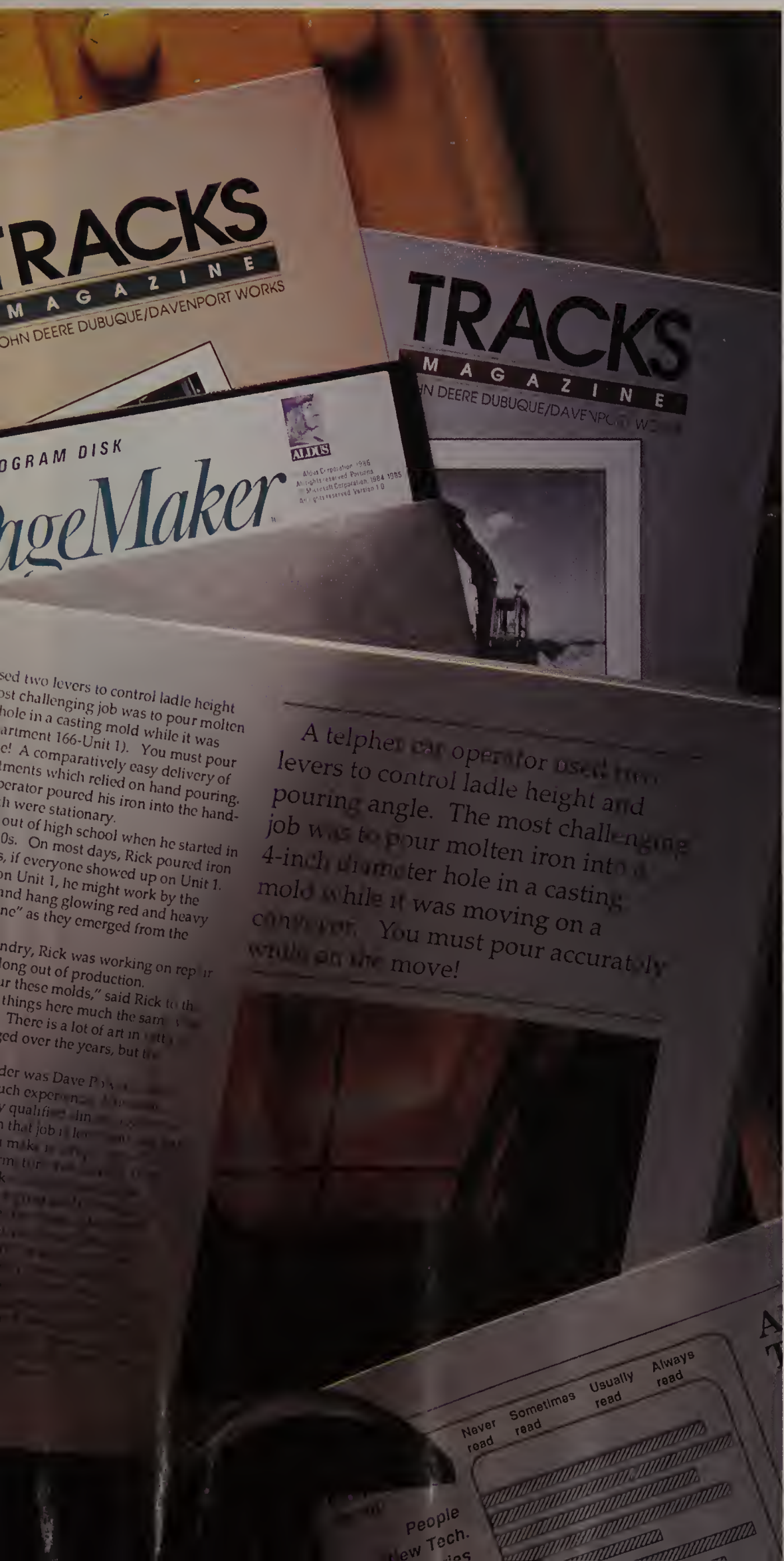

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David Bunnell

The Challenge of Hypermedia

Just as desktop publishing opened a Pandora's box of ungainly graphic design, will HyperCard unleash the programming demon in us?

The whole notion of hypermedia has been on my mind for a long time. I began to really think about it seriously, though, at Macworld Expo in Boston this past summer. That's when Apple introduced *HyperCard,* the new software created by Apple Fellow Bill Atkinson and now included with every Macintosh. I was amazed at people's reactions.

HyperCard was greeted variously as "the greatest thing since Mom and apple pie and the Mac," "the most important development since the Macintosh was invented," and "the next step in personal computing." So I feel we owe it to ourselves to give the whole concept of hypermedia its semiannual checkup–a sort of hyperexamination.

Several personal-computer wizards have created different forms of hypermedia over the years. The word *hypertext* was first coined by visionary Ted Nelson back in 1965, when he was searching for a term to describe nonsequential writing on screen. Mouse inventor Doug Engelbart was also a prophet of the hypertext idea.

A couple of years ago Alan Boyd, president of OWL International in Bellevue, Washington, actually developed a working hypertext product called *Guide.* We used *Guide* at PCW Communications to create the world's first hypertext magazine when we did an issue of *Macworld* on disk early this year.

Another hypertext product in this hypermedia family was created for the IBM PC and the Atari ST around that time. It's called *Zoomracks* and was produced by Paul Heckel's company, Quickview Systems, in Palo Alto, California.

But none of these efforts seemed to get very far.

Now Apple comes along hyping *HyperCard* for every Mac, and suddenly it's the greatest thing that ever happened to personal computers. People say it out-VisiCalcs *VisiCalc.*

As Ted Nelson likes to say, "The reaction to any new idea is first, 'It isn't true'; then 'It isn't new'; then 'We knew it all the time.'"

So what about *HyperCard?* In Apple president and CEO John Sculley's words, it's a "new way to organize information." It's not a traditional database with a hierarchical structure. Rather, it allows you to organize text, pictures, and sound by association–by context. The same way we organize information in our minds.

When I first saw it, it seemed wonderful. Just what I always wanted. So why was I also nagged by the thought that *HyperCard* was for the birds?

It took a conversation with an old friend of mine, Nelson Winkles, to figure it out. Nelson and I go back to *Personal Computing* magazine, where I was the publisher and he was the editor. He's been a brilliant and iconoclastic commentator on technology for more than 20 years. He pinpointed the fundamental problem with *HyperCard* by telling me a story that illustrates it perfectly.

Back in 1963, he worked on a project to create a navigating system for satellites. NASA needed a series of landmarks that would be easy for a crew to spot, such as isolated islands, volcanoes, or lakes. Nelson and his project team were trying to find information about an island called Islote Pelado, off the coast of Peru. They had found it on aeronautical charts and needed to know its characteristics.

They needed to find out, for example, if the size of the island changed a lot with the tides, what color the island was, and whether the vegetation changed. Was there a different spectral output in different

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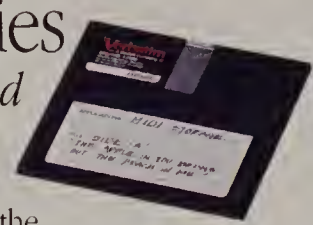

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seasons, and what was the weather like? Nelson couldn't find out anything. Even the Peruvian consulate couldn't help.

They finally went to the Department of Systematic Biology at Stanford. The department had just been moved, and its books were all piled up at random, along with lots of stuffed animals. It was an exotic situation, but all of the usual library searching and referencing systems were suspended. Nelson and his team were explaining their dilemma when the librarian said, "Here, try this."

"It was a book called *Birds of the Americas,*" Nelson said with a smile. "Somehow it had clicked in her mind that we might be able to find something in that book."

So they rummaged through it and found a passage about Islote Pelado. The author had landed there in 1924, and his crew had had quite a time because the island had cliffs all around it, and there was no beach. Well, that told Nelson the island didn't change much in size.

The crew had finally climbed onto the chalky-white land, but they were disappointed because there was only about one load of guano from it. It was hardly worth the effort. So Nelson learned the island was guano-colored and that there wasn't much vegetation.

It turned out everything they needed to know could be figured out from that book. But the interesting thing is that the author thought the book was about birds. The publisher thought it was about birds. The person who did the index thought it was about birds. Nobody in the world thought it was about islands except Nelson and his team. And the only way *they* happened to make use of it was that a librarian had leafed through the book one day and then thought to show it to them.

The moral of Nelson's story?

If the person who designs the index thinks the book is about birds, you'll never find out it's about islands. Unless you run into the right librarian.

And that is precisely *HyperCard*'s Achilles' heel. As Nelson concluded, "The basic problem with *HyperCard* is that the classification is determined by the person who does the classifying in the first place–someone who doesn't know how your mind works. There's no general solution for this problem, just steps along the way until this stuff is truly content-addressable by anyone."

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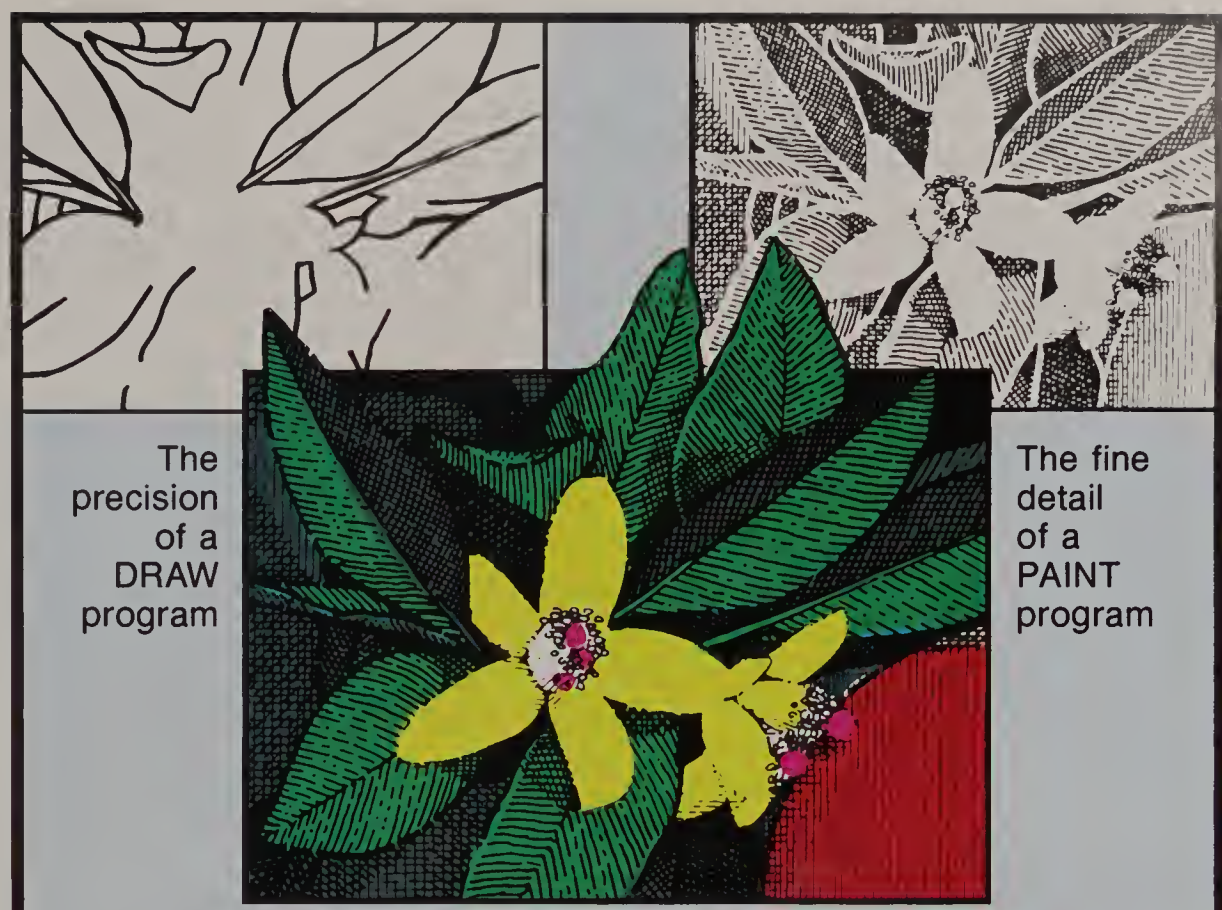

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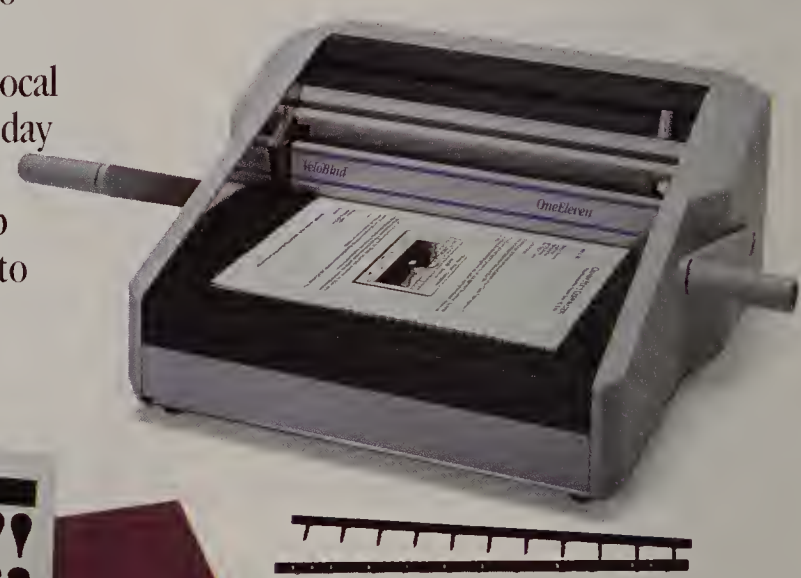

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Circle 27 on reader service card

David Bunnell

I do think *HyperCard* is a good step forward because it legitimizes the whole concept of hypermedia. I just don't think it's the be-all, end-all package–at least not yet. It's only one manifestation of hypermedia. I think, for example, that *Guide* should be a tool within *HyperCard*. So should *Zoomracks*. Both *Guide* and *Zoomracks* can be easier to use when you're working with a huge amount of data. With *HyperCard,* you're restricted to the size of the screen, or "card," so you have to divide the information into different cards. *Zoomracks* has card-scrolling capability that lengthens your view to 252 lines.

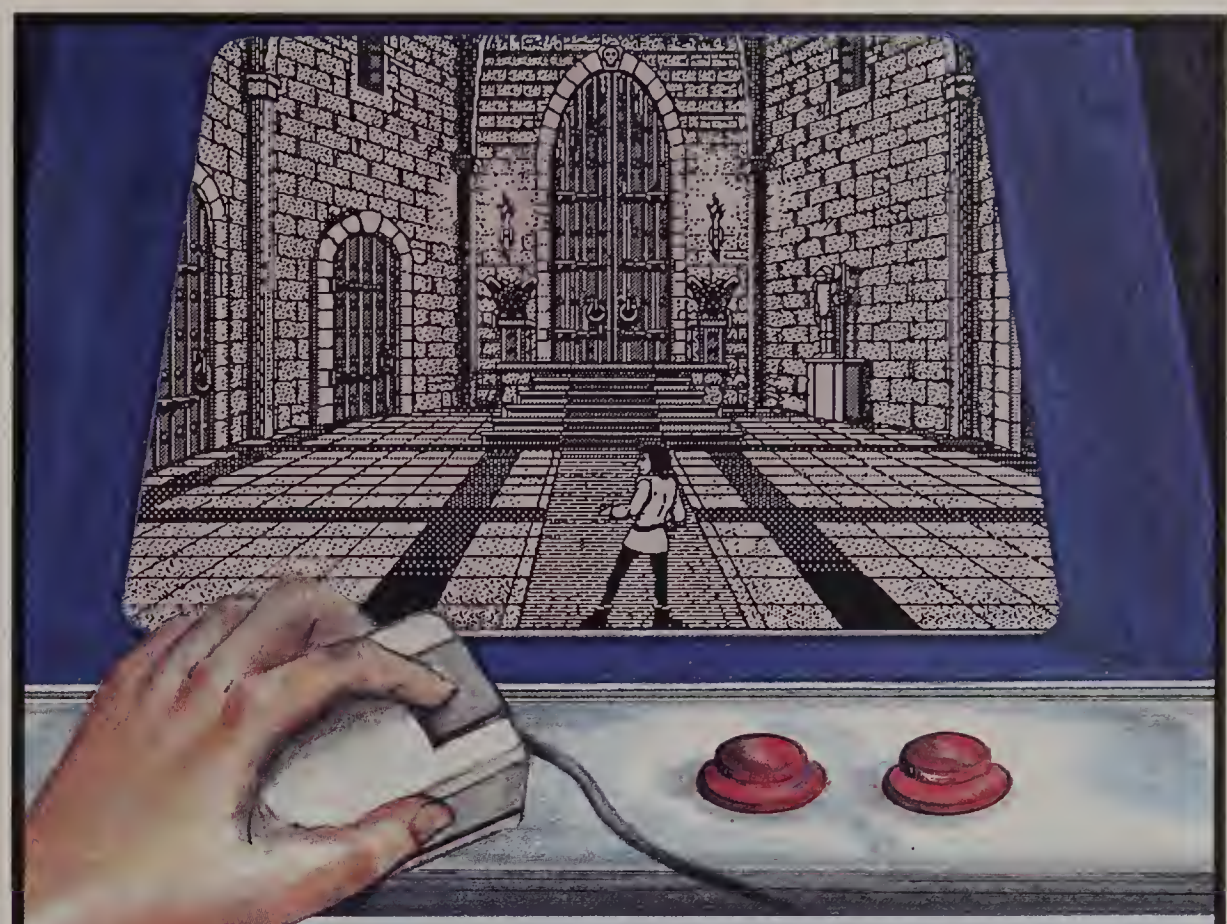
Furthermore, the reference marks, or "buttons," in *Guide* are related to the context of the information itself. In *HyperCard* they relate to the position of the information. So if you move a paragraph in *Guide,* the button moves with the paragraph. That's how it should be. But in *HyperCard,* the buttons aren't linked to the text–they're linked to a position on the screen. If you attach a button to a particular word and then go back and edit that line, the button ends up over a different word. That's wrong. The button should be linked to a concept.

On the other hand, *HyperCard* excites me because it has real potential to become a bona fide hypermedia vehicle. In my opinion, the most important aspect of *HyperCard* is that it could be the link between personal computers and video.

It could be the much-promised, long-awaited, and passionately predicted product that will finally make the personal computer a genuine communication tool, not just a processor. It could be the window on the worlds of text, video, and sound.

Of course, there will be flak. Just as desktop publishing ushered in a wave of ungainly graphics design, *HyperCard* will probably unleash wild and reckless bike gangs of programmers who will criss-cross the hyperhighways of personal computing, leaving the potholes and debris of incompatibility in their wake.

But I have faith that we will ultimately find our way. I am confident that one day, for example, we will have compatible hypermedia that will run on the IBM PC or the Macintosh or the Apple II or on any machine of your choice. We all have to push for compatibility because it will make the whole personal computer proposition that much more powerful. That's not too much to expect. After all, we already live in a hypermedia world. □



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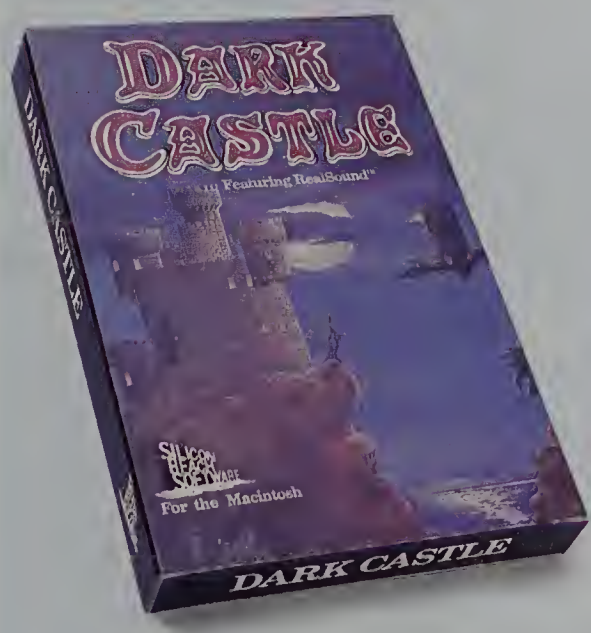

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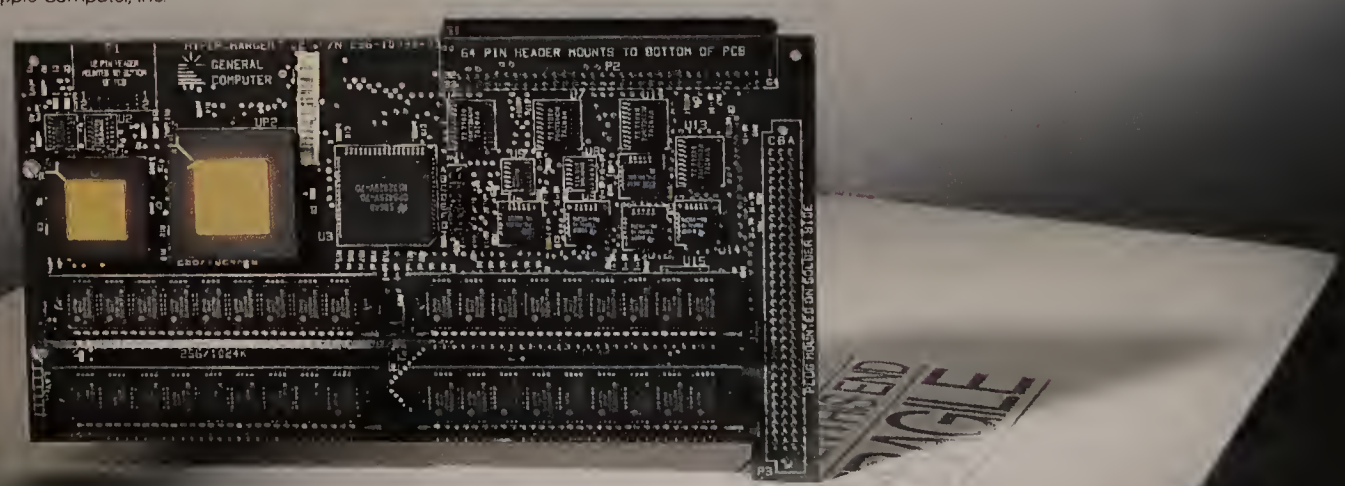

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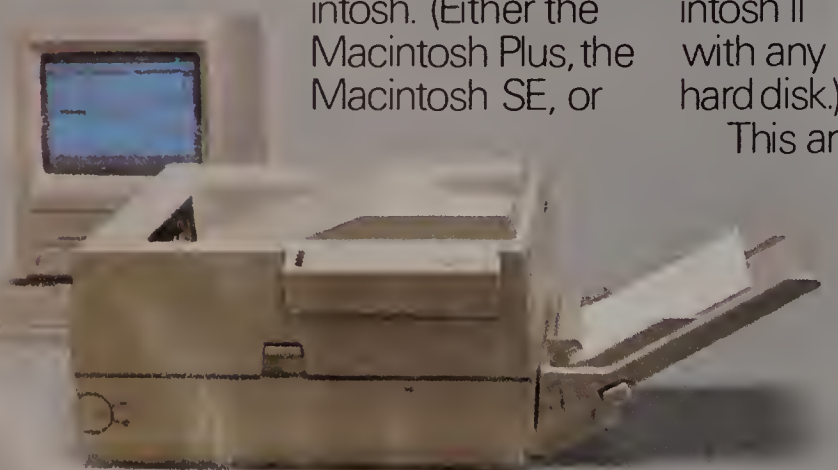

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The newsletter of personal money management

THE PRUDENT Investor

Vol. V
No. 2
July 1987

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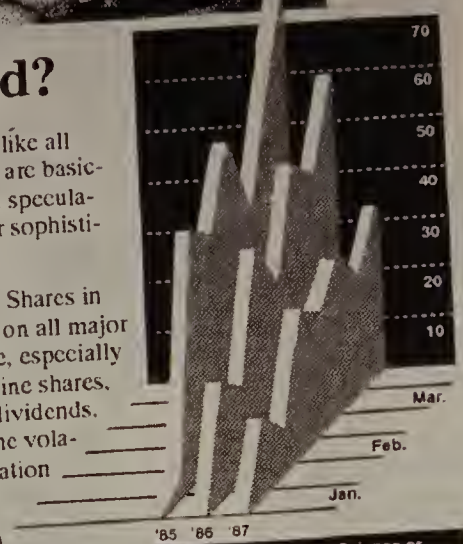
continued on page 12



Technical Analysis: Science or Sorcery? See page 6

Picking Your Stockbroker

If you happen to be picking a stockbroker for the first time, a good way to begin is with some solid recommendations.

Ask your lawyer, accountant, or banker for the name of a stockbroker, or a brokerage firm, that could take on your account.

Some investors suggest you choose several brokers at different firms and let each handle a part of your portfolio until you decide on the right one.

The broker you choose should have a philosophy about investment that is as close as possible to your own. Find out how he

continued on page 5

The Rising Fortunes of the Humble Apple

Consumer demand has mushroomed in recent months for fresh fruit and produce.

What are the best plays in this trend for investors?

Dr. Vic Scallione, of the Washington State Department of Agriculture says

continued on page 3

Amex Stocks	4	*Real Estate*	14
Commodities	8	*Special Report*	9
NYSE	13	*Technical Analysis*	6
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Avoiding Wall Street's blind alleys: A Prudent Investor Special Report. See p. 9

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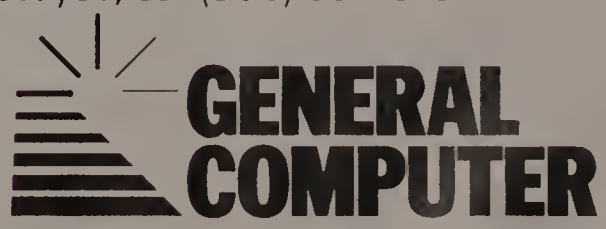

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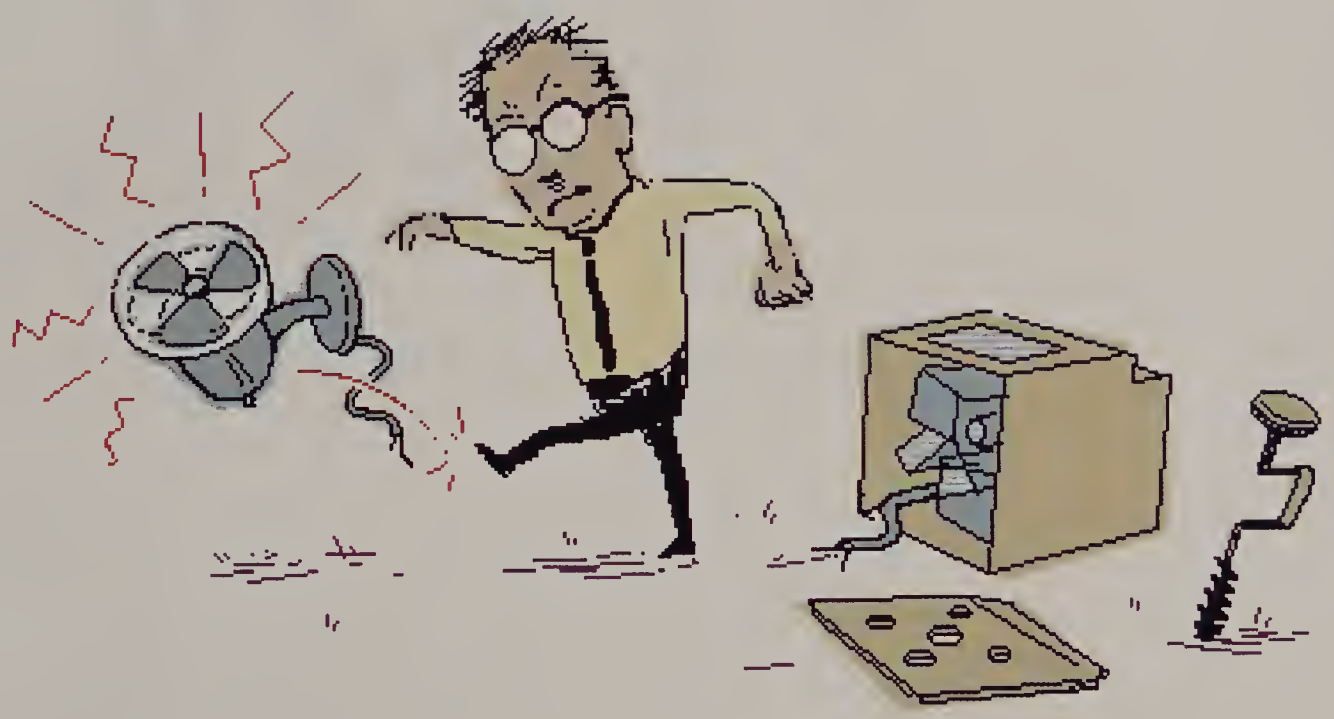
Letters

A forum for Macworld readers



MICK WIGGINS

Noise Pollution
The Mac SE is too loud; Apple's first attempt at installing a fan in a Mac doesn't make it. I ended up disconnecting my SE's fan and drilling holes in the top of the case where the vents on older Macs are. Now I have SE power *and* quiet in my home, without overheating problems. It would be a shame if this superior machine's sales are hurt because of a cheap, noisy fan.

Barry Smith
San Francisco, California

Because there is ample evidence that heat damages components enough to shorten their lifespan, we don't recommend reducing the power of the SE fan, even though it does sound like a rattletrap in a quiet home environment. Apple hasn't commented for publication, but we understand the company is looking into quieter cooling systems.—Ed.

The Downfall of Upgrades
Last fall, after years of using an Apple IIe, I bought a Mac Plus. Now, having had my new Mac for only four months, I find it superseded by the SE—with no upgrade path. Is this planned obsolescence? If the people at Apple can't provide a reasonably priced upgrade (for which there is ample historical precedent with Apple machines), they should be willing to redeem the Plus at its original cost, to be put toward the purchase of an SE or a Mac II.

Rev. Raymond B. Knudsen II
Westwood, New Jersey

Even if Apple doesn't offer an upgrade path to the SE, some dealers may. So far we've heard of one dealer in Utah who offers a trade-in. Anybody know of dealers who do that?—Ed.

Corrections
Steve Brecher's Finder substitute, WayStation *(*Mac Bulletin, *August 1987), is not a shareware product; it's uncopyrighted and available free from user groups and online information services. Sorry, Steve, we just can't seem to believe you're giving it away.*

Laser Laments
We Mac users need the type of story you published on third-party laser printers ["Laser Wars," June 1987]. Even Apple needs such stories—as motivation to make better products. But your article left holes where information should have been.

In addition to reviewing "four representative LaserWriter alternatives," why not list *all* available PostScript printers? And product reviews need support reviews too. Tell us about these manufacturers and their reputations. What does Apple have in store—a LaserWriter based on a 16-MHz 68020 processor, or one that can print a full 8½- by 14-inch page?

PostScript printers are proliferating rapidly—at press time there were 21. Here's a list of models announced since the June article, with dots-per-inch for each in parentheses: three models (72 to 300) from Apollo Computer, Compugraphic's CG 400-PS (406), two models from DEC (300), IBM's Personal Pageprinter (300), NEC's SilentWriter LC-890 (300), NBI's Model 908 (300), QMS's PS 2400 (300), and Varityper's VT-600 (600). In addition, Orange Micro has introduced a $99 cable adapter that lets you connect your Mac to one of the lower-cost non-PostScript laser printers. Finally, we all have expectations about new Apple products, but until the company firms up its plans our speculations are just that—not the stuff on which to base buying decisions.—Ed.

File Search
As a Mac user and *Macworld* subscriber, I have trouble staying abreast of software alternatives. It is difficult to locate individual reviews of competing products when the

(continues)

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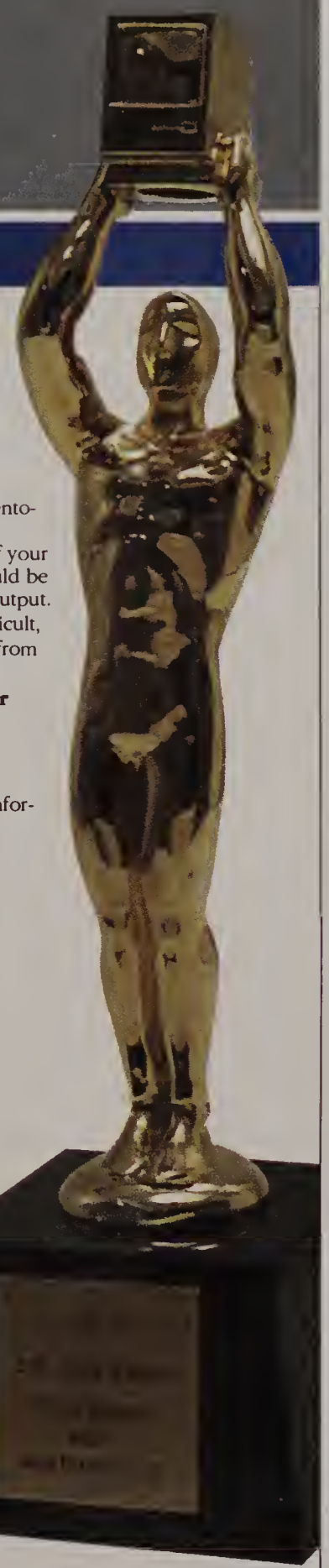


MacCalc is faster than Excel:

"Amazingly speedy...[MacCalc] runs faster than Excel."
InfoWorld, November 3, 1986

Blindingly fast.

"Special routines in MacCalc make operations such as entering data and recalculating, opening files, scrolling...faster than Excel."
Macworld, December 1986

MacCalc is easier to use than Excel:

"[Working] in MacCalc is easier than in Excel."
Macworld

"Designed to be easy to use, and succeeds admirably."
MACazine, March 1987

"MacCalc makes such excellent use of the Mac interface that it is a pleasure to use."
MacUser, September 1986

MacCalc produces quality output:

"MacCalc offers [the greatest] flexibility in page and font setup, and has the most printing options."
MacWorld

"MacCalc functioned flawlessly when asked to display or print any combinations of the fonts or style available. As a result, our spreadsheet output could be used directly in reports."
InfoWorld

Your best choice:

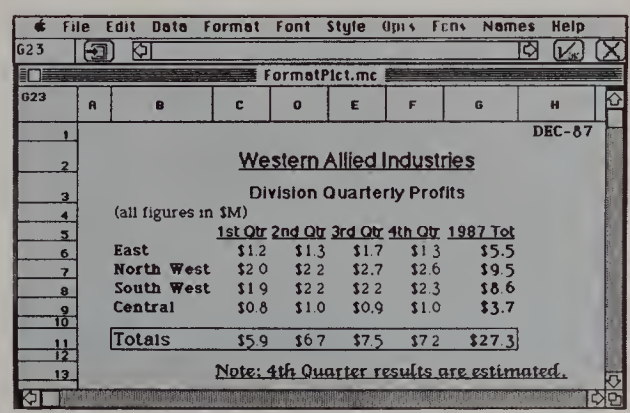
"The result is a clearly superior performer... It is difficult to rate [MacCalc] anything but excellent."
InfoWorld

"MacCalc is the spreadsheet of choice for users who want useful functionality without undue complexity."
MACazine

"The Best Spreadsheet."
MacUser Editor's Choice Award

Special features:

- On-Line Help
- Full Undo command ("fully implemented Undo allows you to recover gracefully from mistakes" — *MACazine)*
- Cell notes, for audit trails and self-documenting worksheets ("Don't underestimate the value of this feature." — *San Jose Mercury News*)
- Reads and writes WKS models (from Lotus 1-2-3 or Excel) and SYLK data
- Variable row height and column width
- Full choice of format, font, size, and style (à la MacWrite) for any cell ("A real boon... adds to that presentation charm." — *San Jose Mercury News*)
- Paste formatted tables from MacCalc directly into MacWrite or PageMaker documents
- Database sort, search, and fill commands ("More powerful than Excel's." — *Macworld*)
- Full desk accessory (DA) support and Switcher-compatibility: MacCalc integrates with your favorite charting or macro programs and DAs



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time comes to choose. Can't you find a way to solve this dilemma, such as selling disks that group evaluations of software in a given area?

Francis Marburg
Falls Church, Virginia

We agree. That's why we've assembled a 200-page collection of reviews—updated, of course—for new subscribers, to fill them in on what they have missed. And that's why we emphasize comparative reviews and overview articles. You can also use the index we publish each year in the January issue to compare a class of products that we've reviewed one by one.—Ed.

Getting Started with Satire

In March, I wrote a letter mocking your simplistic *Getting Started* column by placing it (I thought with wild exaggeration) in the "how-to-dust-the-keyboard" category of usefulness. Now, I find that very category is the topic for July 1987! What's next—how to plug your Mac into the wall?

Hal Barwood
San Anselmo, California

On the Other Hand

For those of us new to computers and to the Mac in particular, it would be helpful if you would run a short glossary of acronyms commonly used in the industry. It is hard to fully benefit from your magazine when one comes across these names without knowing what they mean.

Mark Spiegler
Van Nuys, California

We published "Getting Started with Mac Acronyms" in January 1987. Watch future issues for an updated resource.—Ed.

Dust to Dust

I agree with Jim Heid ["Getting Started with Basic Maintenance," July 1987] that unnecessary cleaning of disk-drive heads can be detrimental, but I've found that dust and other particles can be effectively removed using a portable vacuum cleaner like a Dustbuster. You'd be amazed at how much of the stuff comes out.

Bruce E. Wilson
Lynnwood, Washington

Across the Blue Atlantic

I will be moving soon to Köln, West Germany, where I would like to buy a Mac II or

(continues)

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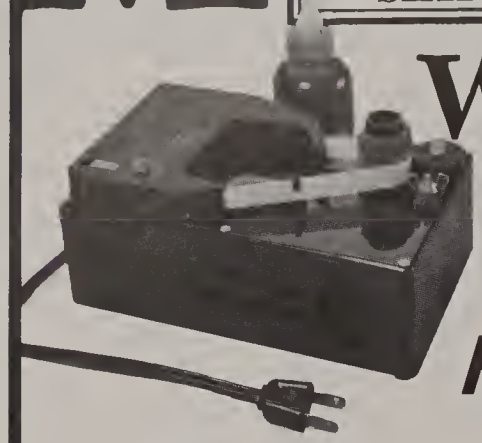

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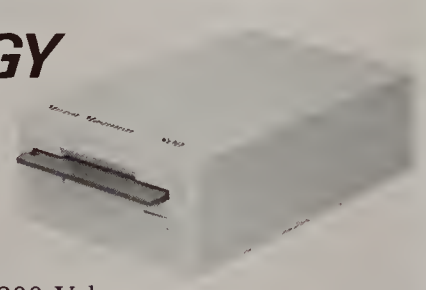

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an SE. Can you give me any information on their price and availability there?

Laszlo Szabados
Miami, Florida

Apple Computer says that both the Mac II and the SE are available in Germany. For dealer and price details, contact the Apple representative in Köln at telephone number 2238-505-76.—Ed.

Music for Pros

As a professional music producer and Mac MIDI consultant, I regret the lack of expertise in your review of *Sound Lab* ["Sound Choice," July 1987], which laments that "it requires a good deal of practice" to use. Well, who can master a CAD/CAM package instantly? As for the reviewer's complaint about price, when studio time costs $250 an hour, *Sound Lab* can pay for itself in one afternoon. Finally, the music community is firmly committed to the Mac, so for a writer in a Macintosh magazine to recommend using an Apple IIe or a Commodore 64 is unbelievable.

Jeremy Roberts
New York City

While the Mac has certainly emerged as the professional musician's computer of choice, musicians on a budget will use whatever they can afford—and many of them are still using the Commodore 64. You are right about the savings possible once Sound Lab *is mastered, but what about the cost of studio time while you figure out how to run it? Musicians are like everyone else: they want tools that make things easier. If we don't speak up when we think a program could be simplified, how can we expect developers to labor over their software design?—Ed.*

Unnecessary Roughness

Our game *NFL Challenge* ["Monday Morning Quarterbacking," July 1987] is not, as stated, for the "novice or casual follower of the game"; people choose it because of its sophistication and realism. *NFL Challenge*'s coaching strategy, based on game plans like those that teams really use, is more appropriate for a simulation than is making up plays as you go along. We have received calls from consumers who say they are ordering the game in spite of *Mac-*

(continues)

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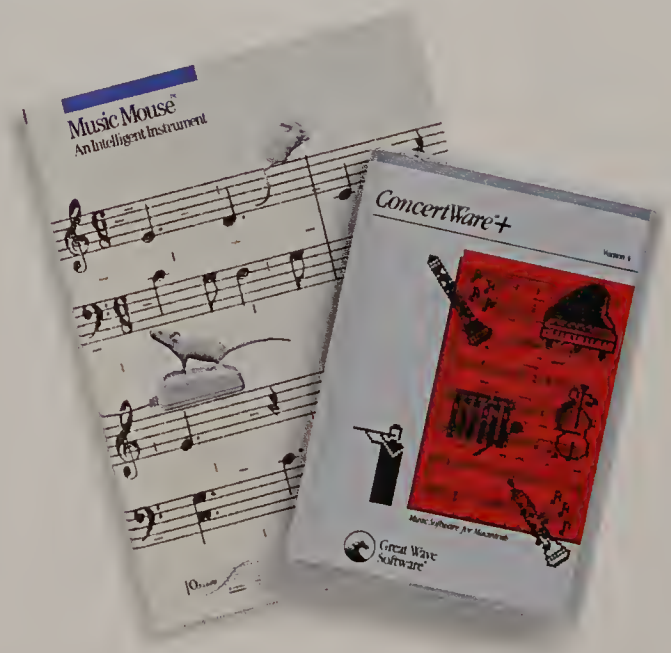

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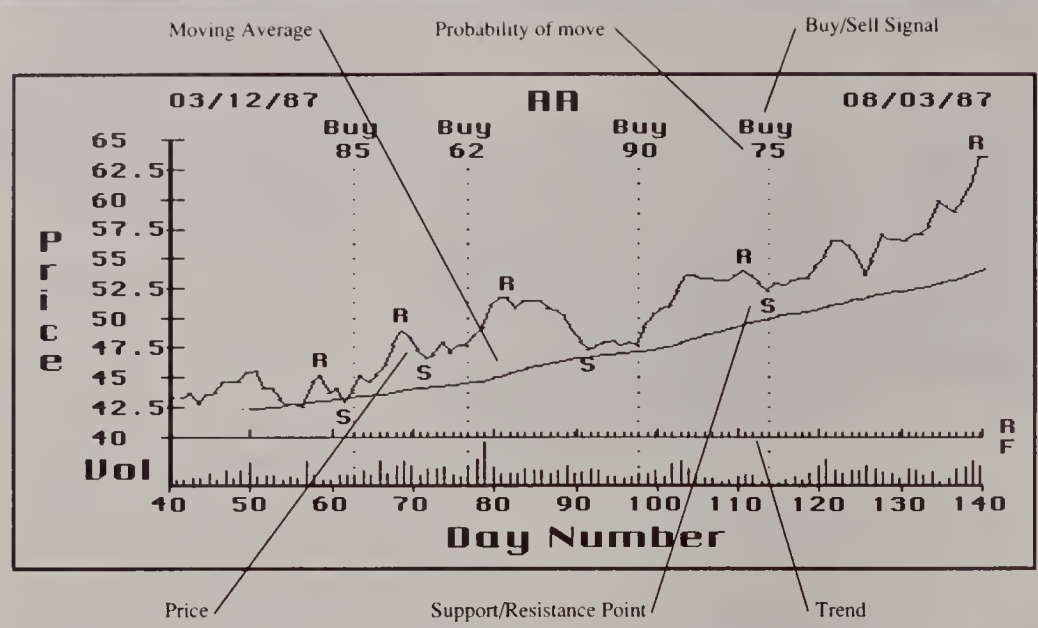

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world's review; we expect an occasional bad review, but please try to be accurate.

Robert D. Krutz, Jr.
Chief Technical Officer
XOR Corporation
Minnetonka, Minnesota

We misstated the number of defensive plays; it's 26, and the number of offensive plays is 49. Otherwise, we stand by the review. NFL teams may have predetermined game plans, but because no one knows beforehand exactly how a game will unfold, teams frequently need to rethink strategies and change plays—often at the line of scrimmage. And there's another reason to allow users to devise their own plans: to hold their interest.—Ed.

NFL Fan

Having once played football, I find *NFL Challenge* is most like the actual game and best satisfies my craving for the game. All players move, not just the ball carrier; you play against the clock; and you can substitute players. Injuries and turnovers give the game more realistic flavor. *Mac Pro Football's* mouse-drawn play selection is reminiscent of sandlot football players scratching out plays in the ground.

John R. Dillard
Waynesville, North Carolina

Another Penalty

Your review of *Mac Pro Football* [*Reviews*, July 1987] did not mention a significant programming glitch: the home team always recovers its own onside kick. Furthermore, the computer always coaches the home team, and you can't tell it not to try an onside kick. What a home-field advantage!

John Abbott
Sacramento, California

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Annual Report

Shareholders Meeting
March 31, 1987

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Agenda: Morning

Corporate Profile

Financial Highlights
Revenue Growth
Domestic
International

Net Income Growth

Acquisitions
X-S WorldWide
Gard in Electric

Agenda: Afternoon

New Products
Standard Applicons
Deluxe Applicons

International Sales

Domestic Sales

Marketing and R&D

The Future

Shareholders Meeting

1

March 31, 1987

APPCO International

Organization

Bob Meyers, Secretary

D. Jones
B. Smillison

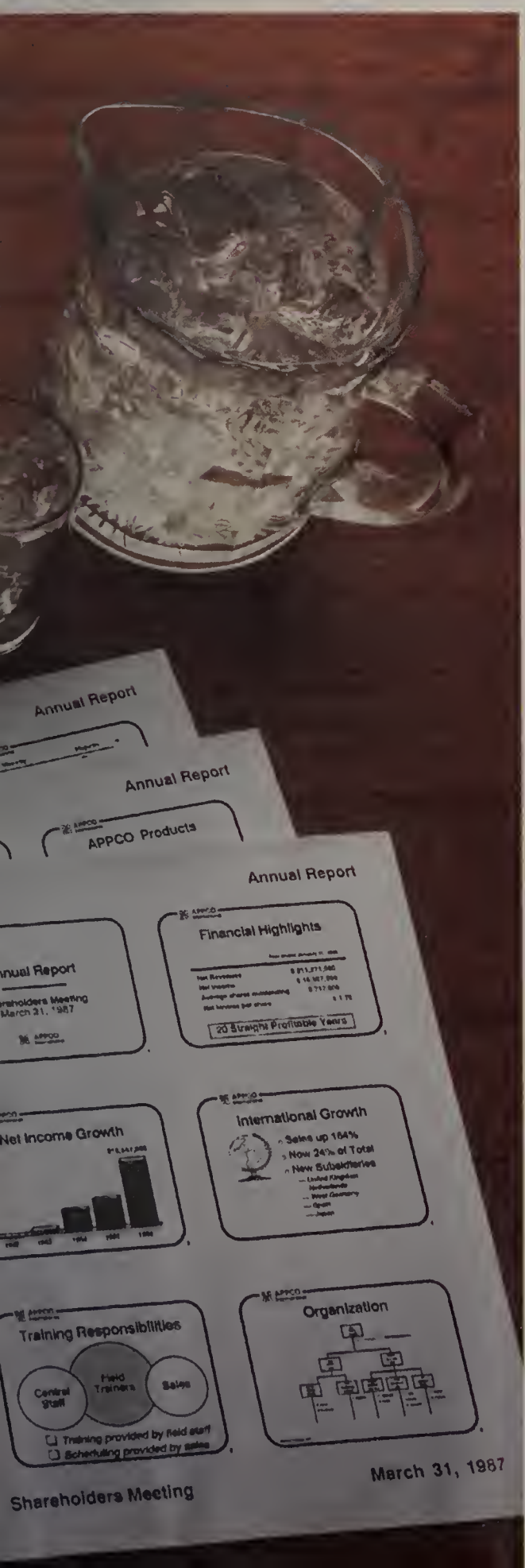
L. Gaskins

Q. Leymond
D. Austin

R. Lutz
S. Wang
S. Crescenti

C. Dellis
K. Thatcher

need to make just add water.



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Michael Day
The Macintosh Journal

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The Macintosh Journal

Cirrus Drives

The Cirrus drives are exciting and excellent performers. They offer impressive speed, flexible software, attractive design and quiet operation.

Ease of Use

Running a Cirrus drive is very simple. It is just a matter of plugging the drive in and turning it on. The drives come pre-formatted and ready to go. The Cirrus has two DB 25 connecters on its case, so its cables are easier to work with than the "standard" SCSI cables that come with some drives. The design of the Cirrus drives contributes greatly to their ease of use.

The software that comes with the Cirrus drives is very flexible. It follows the Macintosh interface closely, and is well done. With the software, users can partition the drives into several volumes, or combine several drives into one single volume. Volume sizes can be changed or new ones added at any time without losing data. Password protection, manual or automatic mounting, automatic head parking, backup utilities, and disk repair utilities are all standard. In addition, the software performs several diagnostic tests including the ability to map out bad sectors and program the drive's interleave. In short, this is some of the most extensive and best written software available for Mac hard drives.

Most of the Cirrus' flexibility comes from their excellent software. However, the physical construction of the drives also contribute to their superior flexibility. Unlike other drives for the Mac, Cirrus drives can be placed vertically or stacked horizontally depending on your desktop requirements.

Performance

Cirrus drives were engineered to perform well in everyday situations. These drives are very fast when performing common operations such as going to the chooser or building the desktop. Reading and writing to and from files is also very fast. Using the Cirrus drives gave us an appreciation of the importance of ergonomic design to performance. For instance, fan noise can increase fatigue in office workers. A drive that is built to be quiet and easy to work with may not increase the data transfer rate, but it will help to get more productivity out of the user. Cirrus drives are quiet and easy to work with which we consider to be a plus in their performance rating.

Because the Cirrus software is so good, users may want to use it to initialize drives from different manufacturers. In our tests, this worked well, and allowed drives of differing origin to be linked together as one volume. Since many of the older SCSI drives came with poor software, this is a good argument for buying a Cirrus drive and chaining it with other drives after they have been initialized with the Cirrus software.

Design and Construction

The Cirrus drives, though very small and lightweight, (about 4 lbs.), are constructed of quality materials designed to last. Their light weight is due to the small number of components in each drive and to their plastic case. The Cirrus drive is both sturdy and durable; the internal power supply is encased in aluminum, and the drives are shock mounted on rubber bearings.

The Cirrus drives have the most exciting, simple and elegant design we have seen in a hard drive for the Macintosh. The modular construction of the drives means that any repair work will be quick and easy. Simply put, Cirrus drives are a joy to work with.

Recommendations

Cirrus drives were designed for the the professional user. They were not engineered to be low cost products, or to be "just adequate performers;" they are built with premium components. These are powerful drives with powerful software. Cirrus drives are an excellent solution for users who demand a lot. Readers should also note that several new products are in the pipeline and that a 40MB tape backup and 30MB hard drive are currently available. We give the Cirrus 20, 40 and 60 drives an excellent rating (8 on a scale of 10) and recommend that other drive manufacturers follow the Cirrus example, and design drives that are simple, elegant and impressive performers. *-Michael Day*

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A Fool's Errand

Or, a Baedeker for the Boston Macworld Expo

Twenty-five thousand strong they came to the Boston expo. Enough people to clog the aisles and make some of us long for the good old days when we could get to know all the developers on a first-name basis—nevermore. The Mac industry is now big business. Fortunately there were enough exciting products to justify all the enthusiasm—and the effort of wading through the crowds. Here is a sampler of the new products I saw.

Hardware. Oy! Large-screen monitors for the Mac SE or the II—from Moniterm, MacPeak Systems, New Image Technology, and SuperMac. Accelerators from Levco, MacPeak, and MicroDynamics. The Trans-Link II from Levco carries one to four INMOS transputers. At up to 20 million instructions per second, that makes the Mac a churning urn of burning umph. And there's a small version for the SE. Color printers: Computer Friends showed a driver for the Shinko color thermal printer, while Hewlett-Packard showed ColorJet, the first color ink-jet printer for the Mac. Computer Friends also bundled *Poster-Maker* with the printer. In fact, the company produced the backdrop for its 12- by 8-foot booth with colored sheets from the printer. Neat.

Laser printers were dominated by the GCC Personal LaserPrinter at $2500. However, other vendors were showing similar technology (albeit without GCC's fonts and complete strategy) at even lower prices. Orange Micro promises a QuickDraw (definitely not PostScript) laser printer for under $1500, and Laser Connection was showing—but "not commenting upon for the press"—a Canon-based printer for under $2000.

Scanners are struggling into the real world at last. Microtek demonstrated an 8-bit gray-scale input ability, while Datacopy demonstrated 4-bit gray-scale input software. Olduvai has some interesting software that allows us to train its scanner to read new fonts. New Image Technology has added a flatbed scanner to its line, and Spectrum Digital showed a new scanner. Quark, of *XPress* fame, has wrangled an option to sell the color scanner from Canon now sold by Howtek.

Remember MacViz, publisher of *MacLink Plus?* Well, the company, now called Pixelogic, showed standard video digitized onto a Mac II—real-time video on a Mac.

Hard disks have again become the most volatile segment of the marketplace, as they did during the boom years of the IBM PC. Rodime and NuData have set the benchmark for larger disks, 100MB and above, at $10 per megabyte. NuData showed its tower: a gigabyte of memory in a chassis that includes a Mac II acting as a dedicated server on a network. More spoolers and backup software, from La Cie, Fifth Generation Systems, and NuData. NuData's looked particularly easy to use. Tangent takes the "best use of an IBM PC" honors for this show; the PC serves as a PostScript spooler for Macs. So if you have a cheap PC clone, or one that you no longer use, it can eliminate those mandatory lunch breaks you've taken while the Mac and the laser printer generated complex documents.

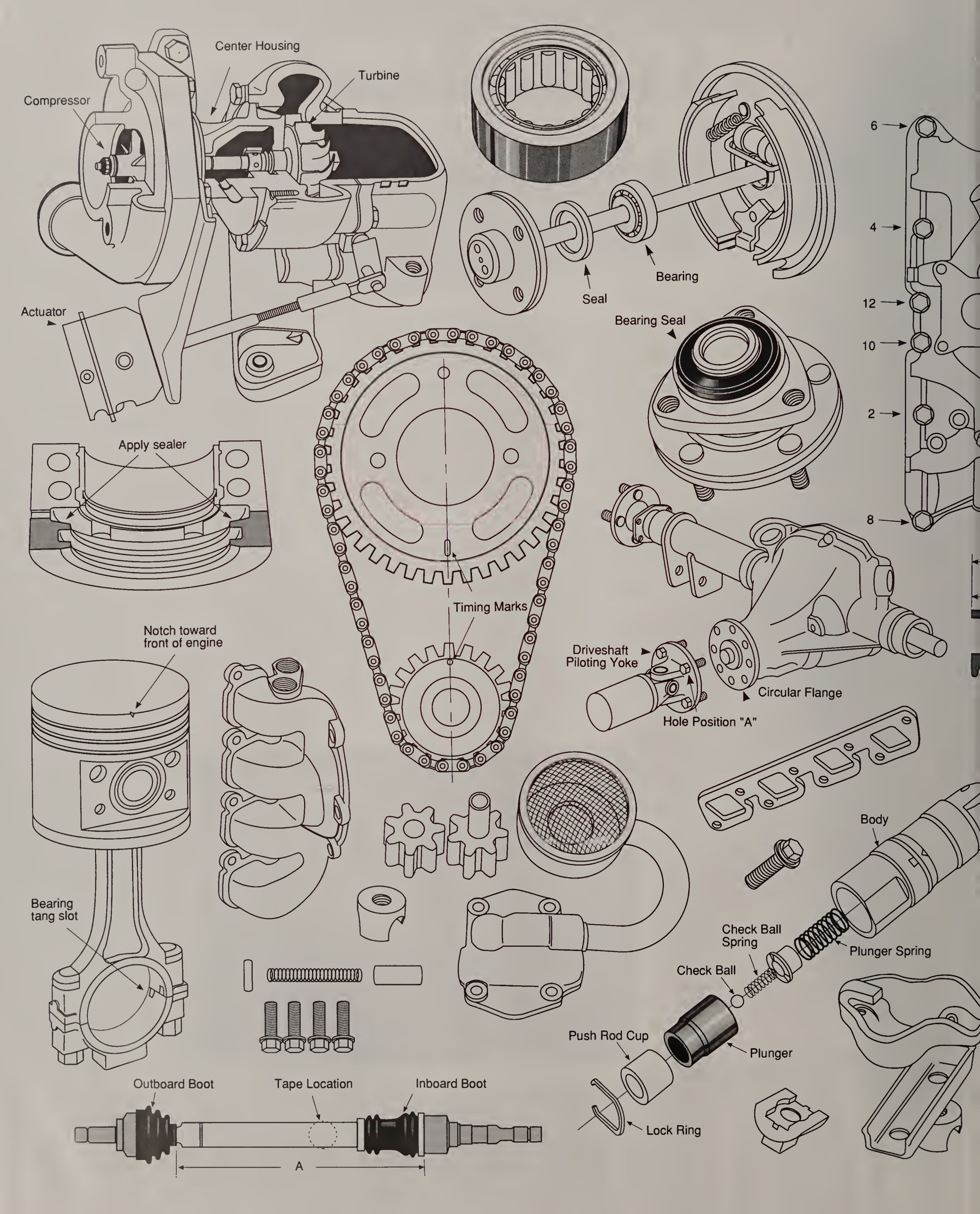
RAM memory upgrades. Now the big three—Dove, MacMemory, and Mass Micro—have competition from Microtech International and Hard & Soft. They can actually ship us some memory to ease the MultiFinder pinch.

Strawberry Tree announced data-acquisition cards for the Mac II and the

(continues)

LOU JONES

A new wrinkle in Boston: hands-on education on the expo floor. Here, training consultant Tod Riedel teaches PageMaker *techniques in the Aldus classroom.*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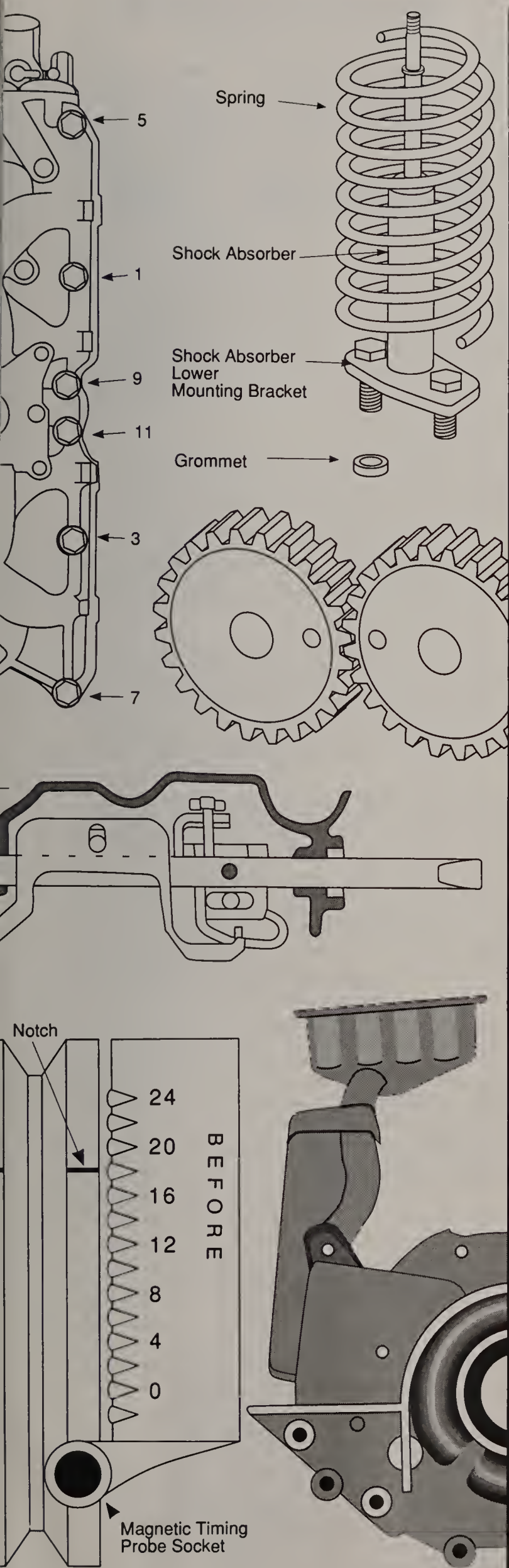

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Mac SE. Automatix showed the Mac II built into an industrial controller driving a pick-and-place robot arm. This is the first Mac II implementation of this kind in the United States. By comparison, it took the IBM PC two years from its inception to move into this area.

The expo was also a hotbed for communications products. Solana Electronics showed a specialized modem that allows access to AppleTalk networks via phone lines, like the Hayes InterBridge. Modem servers—products that allow multiple users to share a single modem over a network—are finally here. We're using the Shiva modem here at *Macworld,* shared among 20 editors. Abaton demo'ed its MultiTalk shared modem. Infosphere announced *ComServe,* extending the concept to include any resources shared on the network—printers, for example. La Cie's *Silver Server* went even further, allowing remote access to hard drives attached to individual Macs on a remote network. Centram has beaten out Apple with a version of TCP/IP for the Mac. Admittedly, as a part of Sun, Centram has the motive and the resources to access files on Sun Microsystems workstations; at least someone has provided this link.

Two companies introduced facsimile modems: Apple Computer and Mystic Valley Research (MVR). Both companies were running a Panasonic modem. MVR has the advantage of having licensed a major directory of fax addresses, available to its users as a disk file. Enter address codes offline to send the same message to multiple sources.

Computer graphics led in the software realm. New painting packages included Letraset's *Image Studio* and SuperMac's *Pixel Paint.* A lot of people seemed to think that *Pixel Paint* was merely *MacPaint* in color. Look again—it rivals the minicomputer paint systems that have had five years to mature. *LaserPaint* now works on color displays. Cricket announced a raft of printer drivers. The first *Adobe Illustrator*-based clip art collections appeared from T/Maker, Image Club, and (in optical-disk form) from Multi-Ad Services. There were new fonts from Adobe, Casady, and Invincible. Those of you using *Comic Strip Factory* should check out the new characters disk.

Both mechanical and electrical CAD fared well at the show. Douglas Electronics' *Professional System* for PC design and layout functions stands up to much more expensive systems. DKL Technology showed

(continues)

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Personal Computing, April 1987

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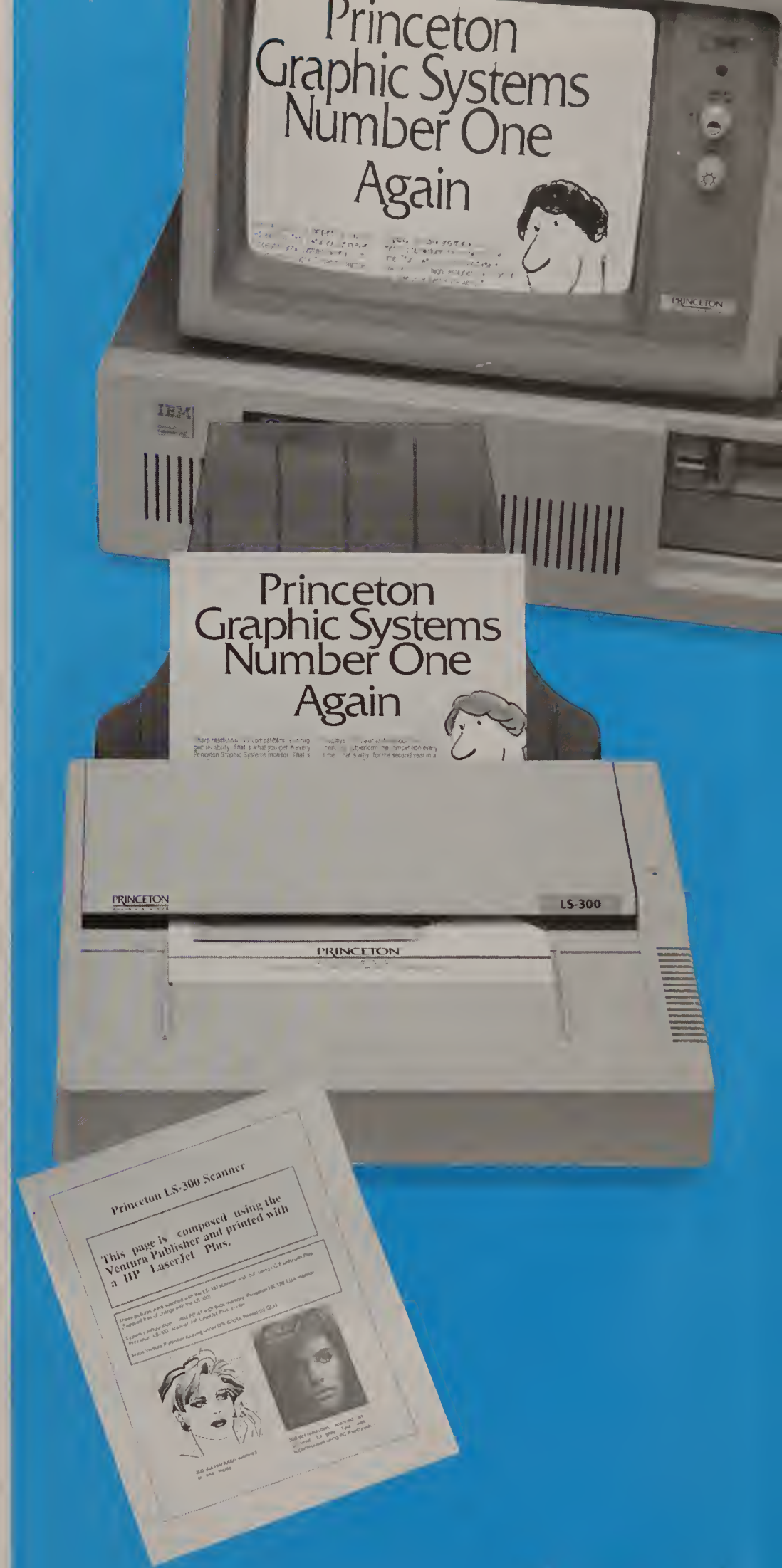

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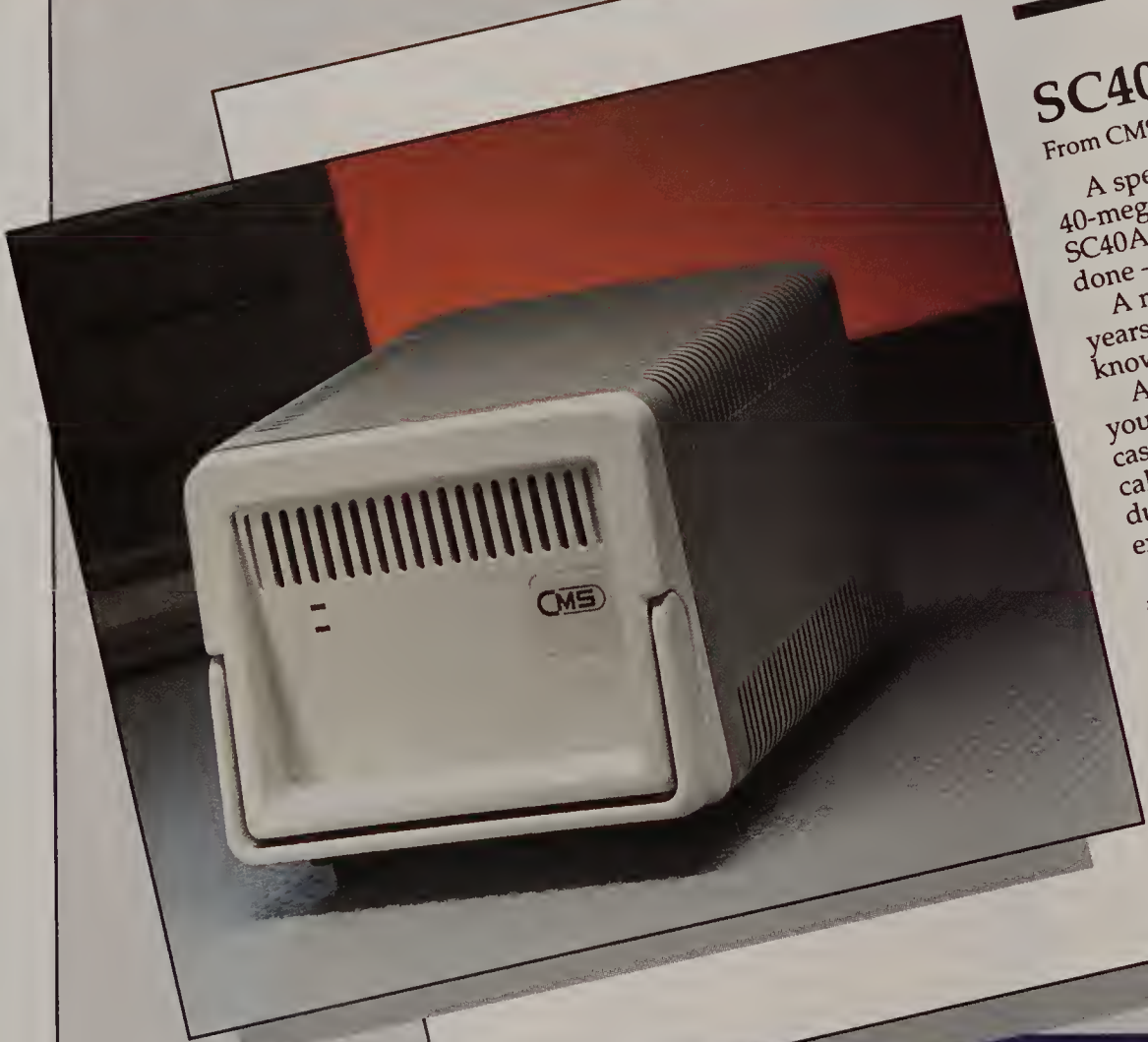

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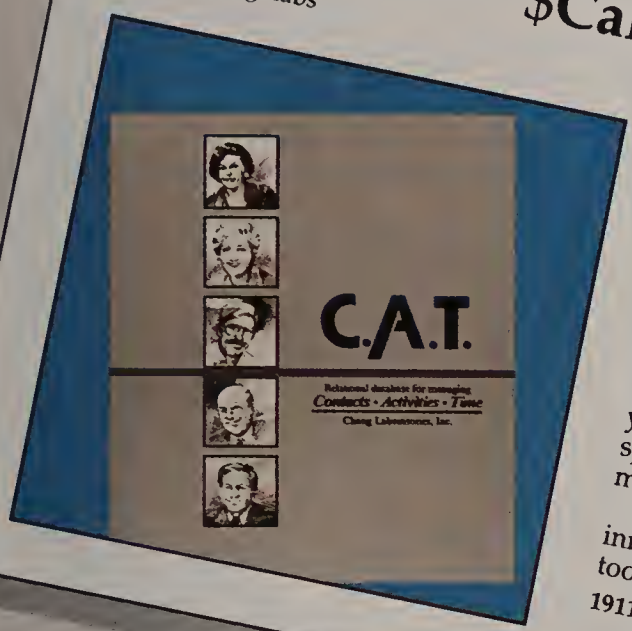

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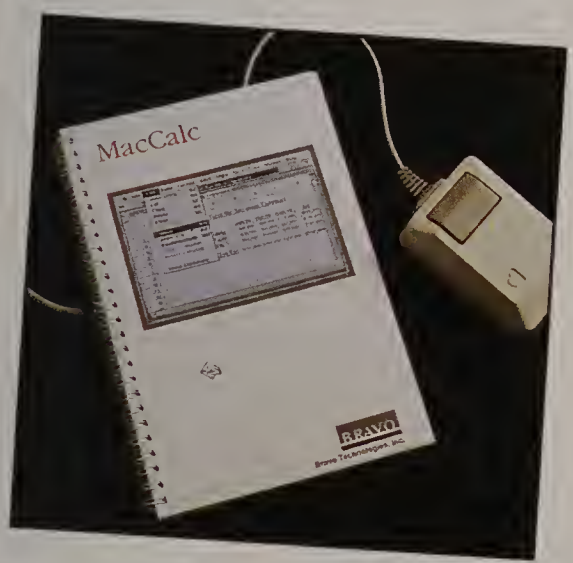

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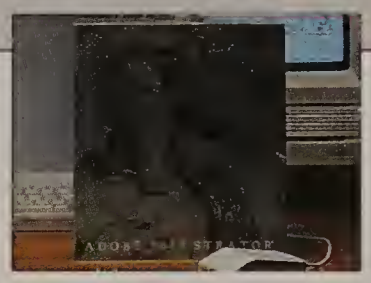

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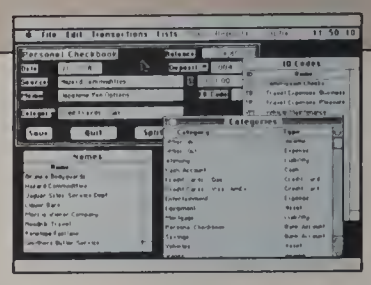
1460	CompuServe Sub. Kit		$ 23
2123	ComServe	NEW	$ 129
	Courier Modems *We carry all Courier modems; call to order*		$ Call
1801	Direct 1200 Modem	SPECIAL	$ 119
2053	EMAC 2400 Modem	NEW	$ 269
	Hayes *We carry all Hayes products, call to order*		

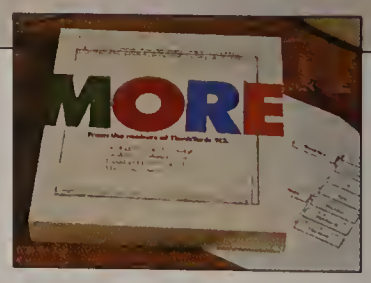


Keep a clear picture of your finances with **MacMoney**, the award-winning personal accounting package that is easy to learn and use.
Works w/512K, Mac Plus, SE & II
1803 • From Survivor Software
$40

1437	InBox Starter Kit		$ 249
1593	• InBox Personal Connection		$ 89
1973	inTalk		$ 159
1132	MacEnhancer	SPECIAL	$ 175
1731	MacLink Plus w/8' Cable		$ 159
1396	MacServe (per server)	SPECIAL	$ 169
2046	MicroPhone 1.1 *New version, bundled w/Glue*		$ 119
2063	Modular Cable Kit *500' phone cable, 100 connectors & crimping tool for do-it-yourself network connections*	NEW	$ 99
	PhoneNet Networking Products		
1739	• For 128 & 512K /E		$ 49
1740	• For Mac Plus, SE & II		$ 49
1765	• AppleTalk Adapter		$ 8
2006	Pocket Modem		$ 189

HARDWARE

1902	AST TurboScan	SPECIAL	$1649
2003	Datacopy Scanner 730		$1589
2004	• Software & Interface		$ 599
2093	• Document Feeder		$ 459
	Dove Computer Corp. *We carry MacSnap Memory Upgrades, including the new 8S for the Mac II; call for prices — we have the lowest!*		
	Kurta Graphics Tablets *Save up to 20%*	ON SALE	
1900	• IS/One (12 x 12)		$ 649
1898	• IS Penmouse (6 x 9)		$ 199
1899	• Series One (8.5 x 11)		$ 359
1946	• IBM XT Interface Kit		$ 39
1901	• Corded 4-Button Cursor *Works w/Series One only*		$ 69
1944	• Cordless 4-Button Cursor		$ 109
1945	• Cordless Pen *Both work w/IS One & IS Penmouse*		$ 109
1452	MacBuffer/256K		$ 249
1451	• MacBuffer/512K		$ 329



Anyone who needs to create outlines, manage schedules, or transform ideas into presentation graphics will benefit from **MORE**'s powerful features.
Works w/512K, Mac Plus, SE & II
1641 • From Living Videotext
$159

1450	• MacBuffer/1024K	$ 429
1207	MacVision	$ 175
	MicroGraphic Images	
2092	• CineMac Comp Card *NEW*	$ 79
2095	• MegaModule Card *NEW*	$ 79
2096	• MegaScrn SE*M (19.5")	$1499
	Works w/SE only	
1850	• MegaScrn II (19.5")	$1499
	Works w/512K & Mac Plus only	
	MinuteMan Power Supplies	
1866	• MinuteMan 250	$ 289
1867	• MinuteMan 300SS	$ 439
2118	• MinuteMan 600SS *NEW*	$ 739
	ScripTEN PostScript Laser Printers	
1996	• 2MB Printer *SPECIAL*	$3699
1997	• 3MBPrinter *SPECIAL*	$3999
	We carry all ScripTEN accessories & supplies	
1871	Seikosha Printer	$ 229
1141	• Printer Stand	$ 17
1935	• Ribbon for Seikosha	$ 8
1054	ThunderScan 4.0 *SPECIAL*	$ 199
	New version works w/512K, Mac Plus & SE	
1570	T'Scan to Plus/SE Adapter	$ 49
	Needed for earlier versions only	

The **Seikosha Printer** is a dot-matrix printer that works just like the ImageWriter. Get the same quality and convenience for less than half the price.
Works w/any Mac; requires cable
1871 • From Seikosha America
$229

Disk Drives

	Bering Totem SCSI Drives	
1903	• 20-meg Cartridge Drive	$1595
1906	• 20+20 Dual Cartridge	$2295
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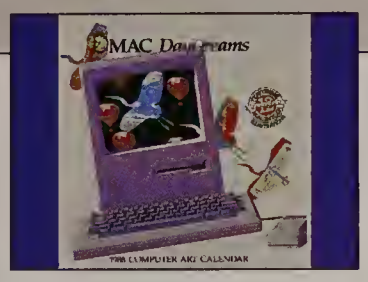
	We carry accessories for your Bering Drives; call to order	
1701	Bernoulli 5-meg Serial Drive	$ 499
	Call to order other Bernoulli drives & accessories	
	CMS SCSI Drives	
1971	• Compact S20A *SPECIAL*	$ 599
1970	• Compact S40	$ Call
1969	• MacStack SD20	$ Call
1968	• MacStack SD43	$ Call
1967	• Pro 40 SE Internal Drive	$ Call
2124	• Pro 40 II Internal Drive	$ Call
2100	• SC40A *SPECIAL*	$ 799
2085	• S-140	$2795
2086	• S-240	$3995
2087	• S-320	$5295
1972	• SE Internal Cabinet Kit	$ 149
	MacBottom Drives	
1323	• HD 20 Serial/Beige	$ 859
1653	• HD 21 SCSI/Beige	$ 859
1988	• HD 21 SCSI/Platinum	$ 859
1843	• HD 21M/Beige	$ 999
2111	• HD 21M/Platinum	$ 999
1842	• HD 45 SCSI/Beige	$1289
1989	• HD 45 SCSI/Platinum	$1289
1845	• HD 45M/Beige	$1429
2112	• HD 45M/Platinum	$1429
1846	• Modem Upgrade/Beige	$ 189
2113	• Modem Upgrade/Plat.	$ 189



Brighten up any wall! The **Mac DayDreams** wall calendar features 12 full-color Mac-generated graphics. An ideal gift for friends/colleagues.
12" x 24"; includes Mac tips & trivia
2182 • From Publishing Ink
$10

2185	MicroMAC 800K Drive *NEW*	$ 184
	NuData SCSI Drives	
	We now carry NuData drives; call to order	
	Zap SCSI Drives	
1892	• Zap SS-10	$ 459
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Accessories

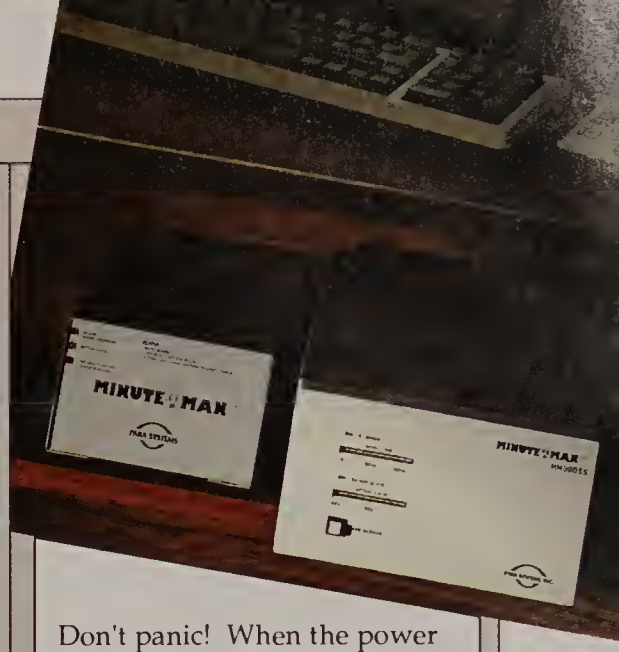
2079	AnthroCart	$ 249
2080	• Side Car Printer Stand	$ 189
2081	• Slide-out Shelf	$ 89
2082	• Storage Basket	$ 53
1142	A+ Mouse	$ 79
	Backup Cassettes	$ 18-28
	We carry cartridges to fit most tape backup systems	
	Books	
2117	• *Graphics Guide for DTP* *NEW*	$ 14
1905	• *How to Write Mac Software*	$ 24
1908	• *MacAccess*	$ 19
1690	• *Macintosh Advisor*	$ 15
1893	• *Macintosh Bible*	$ 16
1910	• *Personal Publishing*	$ 21
	Cables	$15-40
	We have a full line of quality cables; call to order	
	Carrying Cases	
1631	• For ImageWriter I & II	$ 69
1644	• For Mac & Mac Plus	$ 89
	Computer Accessories	
1834	• Power Director	$ 66
1813	• PowerLine One	$ 9
1814	• PowerLine Six	$ 33
1498	• PowerLine Strip	$ 39
	Copy Holders	
1882	• Desktop (81/2 x 11)	$ 12
1883	• Desktop/Wide (11 x 17)	$ 19
1884	• SpaceSaver (81/2 x 11)	$ 28

Designed for speed & comfort, the **quadLYNX Trackball** is a quality alternative to the mouse. Requires no movement space on your desk.
Not compatible w/Mac SE or II
1724 • From Asher Engineering
$99

1769	Data Switch/128 & 512K Mac	$ 29
1820	Data Switch/Mac Plus	$ 39
	Disk Holders	
1704	• ACCO Disk Holder	$ 16
1736	• Disk Pak	$ 3
1387	• disk•book-10	$ 12
1399	• disk•book-32	$ 22
1572	• disk•book-Plus (16)	$ 20
1032	• Fellowes Disk Holder	$ 16
1033	• Fellowes w/Lock	$ 18
1597	• Mahogany Disk Holder	$ 28
1815	• Rolltop Cabinet/45	$ 15
1816	• Rolltop Cabinet/90	$ 24
1781	• Traveller-4	$ 5
1780	• Traveller-8	$ 7
1779	• Traveller-12	$ 9
	Dust Covers	
1406	• External Drive Cover	$ 7
1407	• IW (standard) Cover	$ 11
1408	• IW (wide) Cover	$ 13
1410	• IW II Cover	$ 11
1411	• LaserWriter Cover	$ 17

Share modems and other serial devices on AppleTalk with **ComServe**, an easy-to-use software solution that saves you money.
Works w/512K, Mac Plus, SE & II
2123 • From InfoSphere
$129

1404	• Mac/Keyboard Cover	$ 15
1409	• Mac Plus Keyboard Cover	$ 15
1296	Fanny Mac/Beige	$ 59
2102	Fanny Mac/Platinum *NEW*	$ 59
1402	Head & Scrn Cleaner *SPECIAL*	$ 15
	ImageWriter Ribbons	
1876	• Black *EACH*	$ 4
1643B	• 4-Color (IW II) *EACH*	$ 12
	Single ribbons also available in blue, green, red, or yellow; call to order	
	Kensington	
	We carry all Kensington products; call to order	
	Laser Cartridges	
1853	• Black/New	$ 99
1859	• Black/Reconditioned	$ 69
1854	• Blue/New	$ 139
1858	• Blue/Reconditioned	$ 79
1283	MacCracker	$ 20
2182	Mac DayDreams *NEW*	$ 10
	Four-color, 12" x 24" 12-month wall calendar	
1527	MacInker (IW I & II Dedicated)	$ 44
1314	• Ink/Black	$ 3
1310	• Ink/Blue	$ 3
1315	• Ink Roller	$ 4
1650	Mac 'N' Frost/Beige	$ 59
2114	Mac 'N' Frost/Platinum	$ 59
1966	Mac 101 Keyboard/Beige	$ 169
2059	• Mac 101 ADB for SE or II	$ 169
1029	MacTilt	$ 75
2071	• MacTilt - Platinum	$ 75
1832	• MacTilt for Large Screen	$ 80
1943	• MacTilt for Mac SE	$ 75
1977	MouseCleaner 360°	$ 15
1143	Mouspad (7 x 9)	$ 8
1525	Mouspad (9 x 11)	$ 9



Don't panic! When the power goes out, **MinuteMan** gives you 5 to 20 minutes of clean, pure power — so you have time to save your data & shut down gracefully. From Para Systems

1866 • MM 250
Supports 2 Macs w/hard disks
$289

1867 • MM 300SS
Supports systems w/40+ megs or lge. monitor
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2118 • MM 600SS
Supports 4 Macs w/hard disks or 2 w/lge. monitors
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1806	Neos Mouse	$ 49
1718	PC MacKey	$ 119
1724	quadLYNX Trackball	$ 99
1835	QuickStick	$ 49
1657	SCSI Terminator	$ 49
2097	System Sweeper	$ 37

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1344	Diskettes DS/DD-10 *SPECIAL*	$ 18
2073	Diskettes DS/DD-50 *NEW*	$ 84
1144	Diskettes SS/DD-10 *SPECIAL*	$ 12
2072	Diskettes SS/DD-50 *NEW*	$ 58

Prices and availability are subject to change without notice.

NOTE: These prices do not include shipping/handling charges; please call

The optical **A+ Mouse** moves effortlessly across its special pad (included). Quiet & comfortable, it has no moving parts that wear out or need cleaning.
Not compatible w/Mac SE or II
1142 • From Mouse Systems Corp.
$79

800/228-8910
Good anywhere in U.S.

Circle 272 on reader service card

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3½" Single Side	10.95	10.60	9.95
3½" Double Side	15.95	15.50	14.95
HIGH Density	46.95	45.95	43.95

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MAC-PAC-50's	50	100	400
3½" Single Side	.95 EA.	.92 EA.	.87 EA.
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Circle 562 on reader service card

the first integrated-circuit design system on the Mac II. *MGMStation* added color and multiple windowing. Versacad–the second-largest supplier of IBM PC-based CAD software–announced its Mac package, and Computer Shoppe showed a new 2-D CAD product, *PowerDraw*.

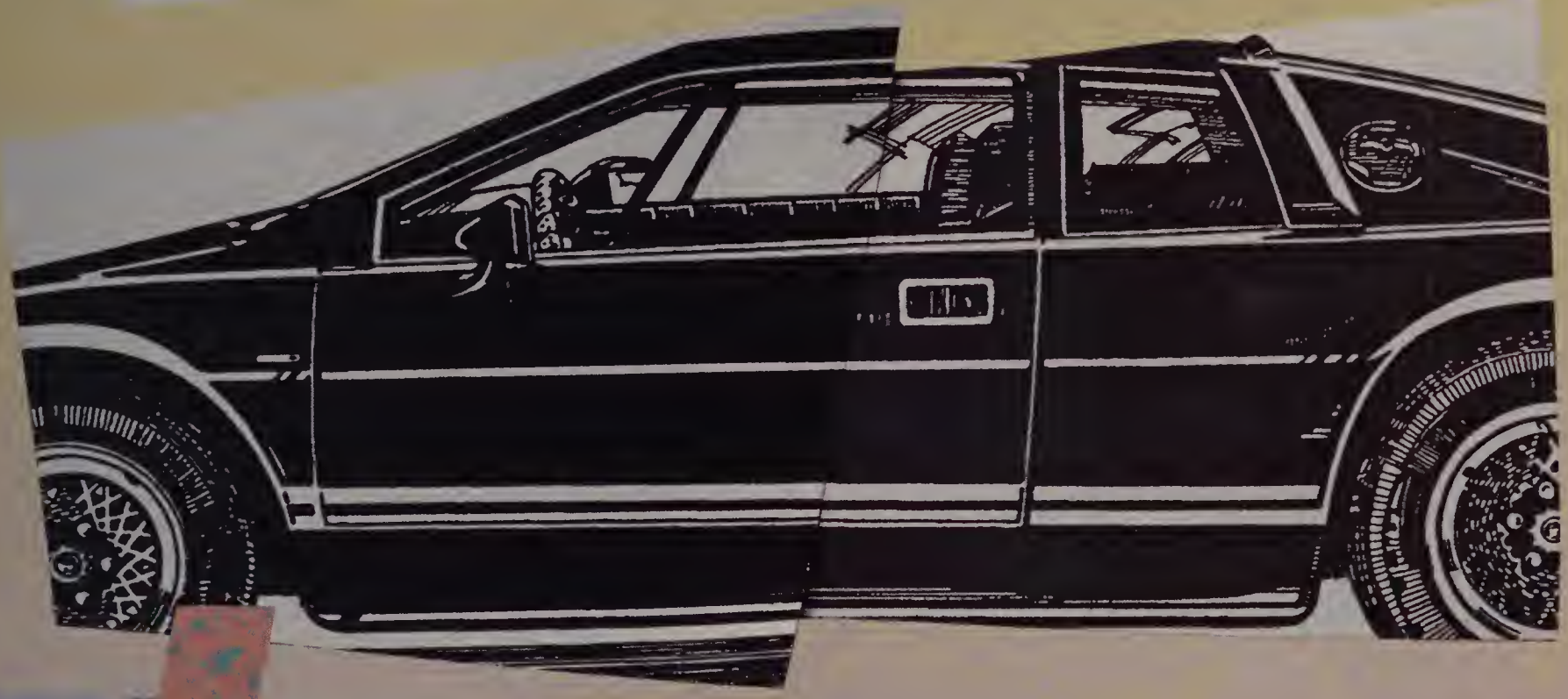
In the miscellaneous category we had two companies with interesting input devices: Anatex's Personal Writer, which allows handwritten characters to be input via a graphics tablet, and MicroTouch's valuable screen input that replaces all mouse functions. We'll probably be seeing that touch screen installed in shopping malls and stores soon. Primera Software had the first of a new generation of music programs for the Mac: *Different Drummer* stands apart in its realism and ingenuity.

Games are making a mild comeback. Brøderbund showed *Bogus,* SES had *Quarterstaff,* Miles Computing had *Fool's Errand* and promised *Harrier Strike* by the end of September. And Spectrum Holobyte showed a pair of war games: *Falcon* and *PT 109*. Still no games, sad to report, making use of the color and graphics on the Mac II.

I had come to the conclusion, before the show, that we had already entered the era of the minimum 2MB RAM Mac. How we could afford to upgrade all the editors was one question; whether the Mac Plus that many of us had would stand up to such an upgrade was an even more troublesome matter. My own Mac Plus promptly shorted out the power supply on my large-screen monitor. "Well, I'll switch to the Mac II in my office," says I. After spending an hour figuring out why the SuperMac monitor wasn't working (older model), building up the System file with all the products that we use internally–*AppleShare, InterMail,* Shiva's NetModem–and a few applications, and tracking down why the laser spooler was not working, I was ready to go. "Faw, I thought. Now I'm on a power machine." Then I tried to install some Adobe fonts. System error. And I only wanted to type a memo. God forbid I should try to "test the network"–that's our internal code for what occurs when someone downloads *HyperCard* from our central hard disk.

I am reminded, as we embark on the product testing that follows an expo, of how I felt after I'd had my old PC rigged out to suit my needs: "If it's not broken, don't fix it." Not an auspicious beginning for a Brave New World of products. □

These unretouched print samples show the superior print quality of QMS-PS 810 over printers using first-generation print engines.



ntroducing the PostScript laser printer that blacks out at high speeds.

The new QMS-PS® 810 can compose and print the most complex pages in record times, with richer, more saturated blacks than ever before. All with the desktop publishing power of Adobe PostScript®, and the superior print know-how of QMS, an industry leader.

Under the hood QMS ASAP™ (Advanced System Architecture for PostScript) is proprietary technology that helps eliminate the hardware bottlenecks that hinder other PostScript printers. As a result, QMS-PS 810 boasts processing speeds remarkably faster than other PostScript printers in its class. And faster output means greater productivity. In addition, the QMS-PS 810 laser printer's new Canon® SX® print engine covers solid areas and prints fine detail better than previous-generation engines.

The new 8-page/minute QMS-PS 810 laser printer

Fast start, strong finish You can adorn your documents with one or all of the 35 Adobe typefaces. Thanks to PostScript, there's an infinite number of font variations available. You can also make type as large or as small as you want. And put it anywhere on the page. In fact, with PostScript you enjoy total control over the design of your page. It gives you the complete desktop publishing power to do things that would otherwise be virtually impossible. So you get high-quality output exactly how you want it.

Along with PostScript, the HP LaserJet+™, Diablo® 630 and HP-GL™ printer emulations are added for your non-PostScript software.

The QMS-PS 810 laser printer is easy to use, maintain, and comes with a one-year warranty. It's available from Laser Connection dealers. Laser Connection is a sales and marketing subsidiary of QMS. For the dealer nearest you call **1-800-523-2696** .

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A QMS® company

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Circle 720 on reader service card

The PostScript laser printer sure to get high ratings at its network debut.

The new 8-page/minute QMS-PS 800 II laser printer

The QMS-PS® 800 II is an 8-page-per-minute laser printer that combines the desktop publishing power of Adobe PostScript® with the superior printer technology of QMS, a leader in printer technology for 10 years. Exceptional paper handling, faster processing speed and a Canon® CXD® print engine with 10,000-page-per-month duty cycle give QMS-PS 800 II the versatility your Macintosh™ network needs.

A network sensation QMS-PS 800 II holds 500 pages, so operators aren't constantly refilling depleted paper trays. Users can even designate automatic switching between the two trays for doing letterhead/second page printing. Select faceup or facedown collation. And manually feed odd-sized paper stock.

With QMS ASAP™ (Advanced System Architecture for PostScript) proprietary technology, QMS-PS 800 II delivers outstanding performance. In fact, the more complex the page, the more it outperforms other PostScript printers. Two megabytes of memory, expandable to three megabytes, also add to the overall page processing speed when you are creating complex documents.

Type casting The QMS-PS 800 II comes with 35 resident typefaces (you can download more if you like). PostScript allows you to scale type to virtually any size, from minuscule to mammoth. PostScript also enables you to design, and redesign, your documents with exacting detail. You have total control over the final appearance of documents, with the ability to place text and graphics anywhere on the page. In short, you get the complete desktop publishing power that only PostScript can give you.

Critical acclaim The QMS-PS 800 II is certain to receive rave reviews on your network. And for a single-user set-up, there's the QMS-PS 810 laser printer. For a demonstration of either, call **1-800-523-2696** for the location of the Laser Connection dealer nearest you. And be sure to ask for *The Sourcebook*™ – our exclusive catalog filled with the latest laser printer products and enhancements.

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Circle 706 on reader service card

Tossing a laser printer's used toner cartridge is like paying someone $60 to take out the trash.

Why? Because it can be refilled with toner and restored to its original condition, for about half the cost of a brand-new toner cartridge. That's how Laser Connection's Toner Refill Certificate Program can save you nearly $700 a year for each laser printer in your office. And while other programs can promise savings, they lack our expertise. Expertise that guarantees you quality.

Break an expensive habit Not only does a toner refill certificate save you money, your cartridge comes back better than new.

Our reconditioning and patented resealing process enables us to refill a used toner cartridge with 50% more toner than it first contained. With a blue toner refill, your cartridge is returned with 25% more of that color. So your reconditioned cartridge will actually last longer than a new one.

To further insure print quality, we use toner that's denser than new and replace your old cleaning rod with a new one.

Get with the program Any toner cartridge used on laser printers employing the Canon® CX® print engine (that includes printers made by Hewlett-Packard®, Apple®, QMS, Canon and others) can be reconditioned.

A participating dealer can get you started. Just purchase a Laser Connection Refill Certificate for each cartridge. You'll find instructions and shipping materials for sending us your empty toner cartridge. You'll get back a factory-reconditioned cartridge returned to you via Federal Express®. A cartridge that costs less and works better than new ones. It's also backed by our guarantee—if you're not happy with the performance of your cartridge, we'll give you another refill certificate to replace it.

To start putting away your $700 in savings, call **1-800-523-2696** for the Laser Connection dealer nearest you. And be sure to ask for *The Sourcebook*™ — our exclusive catalog filled with the latest laser printer products and enhancements.

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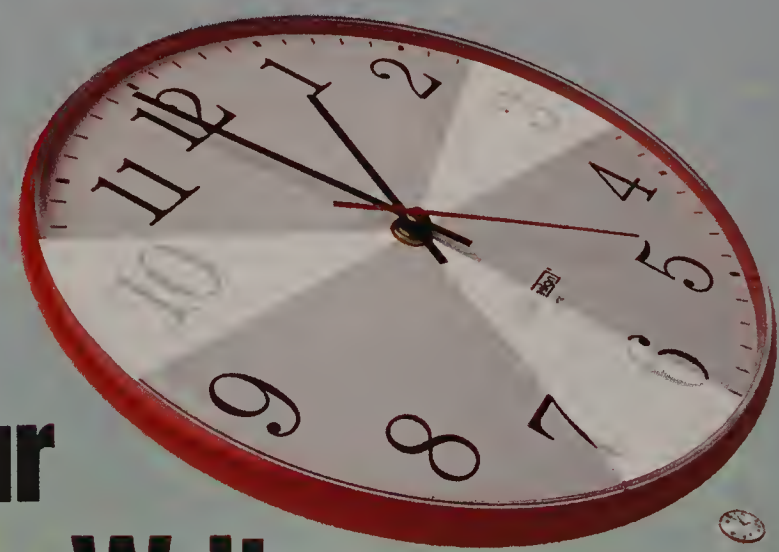
Circle 707 on reader service card

You don't stop to be fed every 12½ minutes. Neither should your Apple LaserWriter.



The PaperPlus 500 Sheet Feeder is for the Apple LaserWriter and all other laser printers that use the Canon CX print engine.

Constantly refilling the paper tray on your Apple® LaserWriter® can eat up lots of your time. Keep that from happening with the PaperPlus 500™ feeder from Laser Connection.

An appetizing solution PaperPlus 500 easily attaches to the back of your LaserWriter, or any laser printer that uses a Canon® CX® engine, including QMS-PS® 800+, QMS KISS™, HP LaserJet™, and others. Its 500-sheet capacity keeps you from giving your laser printer constant attention, especially when you're printing large volumes of documents at one time. You can keep your printer humming continuously for nearly an hour without taking a break—that's a 300% increase in your efficiency.

There's also an increase in your LaserWriter's flexibility. You can load the front tray of your LaserWriter with letterhead, and PaperPlus 500 with second sheets. You can then instruct the printer to pull a sheet from the front tray first, then instructions to pull second sheets from PaperPlus 500.

If after printing your documents you need to mail them, you can quickly turn the PaperPlus 500 into an envelope feeder. It can hold up to 50 envelopes, so you don't have to feed them through by hand one at a time as you would on most other laser printers.

Come and get it Setting up the PaperPlus 500 is quick and easy; you get clear instructions to show you how. It also comes with a high-capacity output stacker to replace the one on your printer.

To satisfy your LaserWriter's hunger with PaperPlus 500, call **1-800-523-2696** for the location of the Laser Connection dealer nearest you. And be sure to ask for *The Sourcebook*™—our exclusive catalog filled with the latest laser printer products and enhancements.

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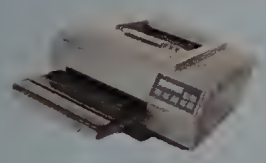
Circle 708 on reader service card

We wrote the catalog on laser printing.



This spring, a company called Laser Connection introduced a new concept to laser printing.

It didn't come in the form of hardware, or software.

Instead, it came as a book. A catalog, actually.

Titled *The Sourcebook*™, it brought together for the first time the full array of products available for laser printing and desktop publishing.

Printers. Controller upgrades. Sheet feeders. Scanners. Monitors. Type fonts. Plus notes, articles and how-to's that help you make the most of your laser printing system.

A collection of best-sellers *The Sourcebook* committed to paper what Laser Connection has been doing quite successfully for some time. That is, working with top manufacturers to give you laser printing solutions that offer greater performance, convenience and cost savings.

Granted, we had some help. Laser Connection is part of QMS, a recognized leader in the development of intelligent printing systems. So teaming with their 10 years of print technology experience, we can give you products that take in all the latest advancements. That's why the QMS KISS® laser printer and PS Jet™ PostScript controller kit were voted best of 1986 by PC Magazine. And why we can offer the widest range of Adobe PostScript® products anywhere, products that time and again have been chosen by industry experts as best in their class.

Where to find our guide in the field
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Contributors Notes

Mary V. Campbell *("Excel Macro Treasury") is a computer training specialist who serves corporate clients. She is author of* Using Excel *and* Excel Macro Library, *published this year by Que Corporation.*

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Michael Mallery *("Beyond Black and White") is a photolithographer and graphic designer who gained hands-on experience in electronic publishing with his arts publication,* Another Room Magazine.

Jim Morton *("Beyond Black and White"), a San Francisco printer/desktop publisher, produces his* Pop Void *modern culture periodical using* PageMaker.

David L. Peltz *("Benchmark: Mechanical CAD") has been involved with computer graphics since 1966. President of CADventures in Chatsworth, California, he consults on microcomputer applications of computer graphics. He is also an associate editor of the* CAD/CAM Journal for the Macintosh Professional.

Bruce Webster *("Just How Compatible Is Compatible?"), a* Macworld *contributing editor, is a widely published writer who specializes in personal computer topics.*

Matt Zeidenberg *("What's in a Window?"), a graduate student in computer science at the University of Wisconsin, has written on artificial intelligence, computer graphics, and networking.* □

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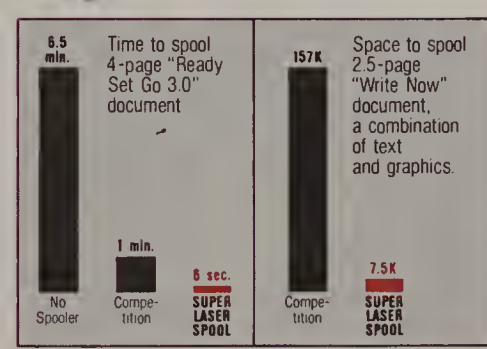

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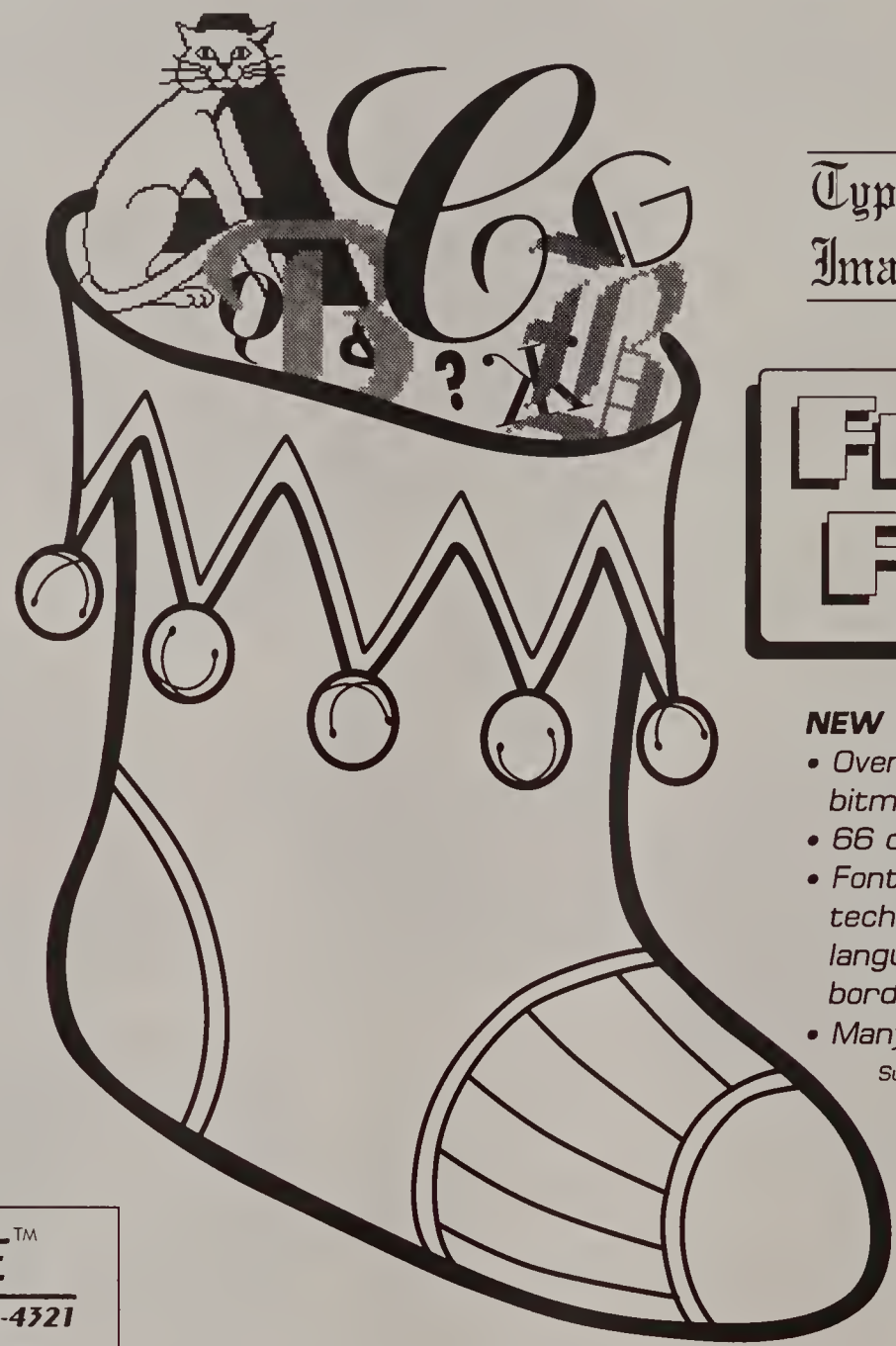

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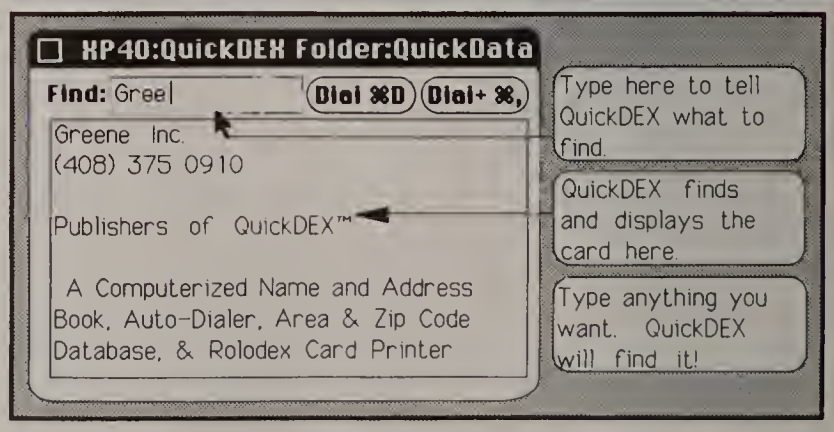

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Steven Levy

The Plunge

You know you want a Macintosh II. But wouldn't it be wiser to wait?

MAX SEABAUGH

Pity the pioneers. They've all heard the old chestnut about fools rushing in where wise men fear to tread. Yet, virtually barefoot, they eagerly propel themselves into the unknown–and tread, tread, tread. Not a sole remains unscathed. Those of us who consider ourselves wise men and women give those intrepid ones pleasant fare-thee-wells and hang out until they return from the frontiers. We watch them unravel the bandages from their feet. We listen to their tales, shudder at their travails, and make note of the trails they have blazed. Those are trails on which we will later travel. When they are paved, and there are no thorns and stones to bruise our Adidas.

And what do the pioneers get for their troubles? They get to be pioneers.

I interrupt this column to make a confession. When I chose the pioneer metaphor, I noticed that it was sadly tattered. And I admit that there was a label reading "Avoid applying this metaphor to anything about personal computers..." But after exhaustive examination of the metaphor rack, I was forced to use the pioneer model–because it so neatly fit my subject.

You see, my concern here is the question that arises whenever a desirable new computer is introduced. Especially the Macintosh II, a computer with breathtaking power, hair-raising speed, an ample color display, and the ever-popular open architecture. Obviously, the machine ratchets up the conception of what a Macintosh is, maybe even what a personal computer is, by two or three notches. The very existence of an object like this can drive a certain kind of person wild. "You want to know why I want a Mac II now?" asks early buyer Lee Snover, in response to a query I posted on CompuServe. "It's quite simple. PURE, UNADULTERATED, ILLOGICAL L-U-S-T."

Lust has its price. History instructs us that computers are never so expensive as when they are first introduced. Price increases are almost unheard of in the personal computer business. But new computers are doubly expensive, since the first units reach the stores in a trickle, and stores seldom find it necessary to offer discounts on those early arrivals. The first Macintosh is a good example: people who bought the original 128K version at its $2495 list later had to spend as much as $2000 more to upgrade the machine to the level of a Macintosh Plus, which now has a street price of around $1700 new.

History also suggests that the first computers off a production line do not emerge as perfect objects. Flaws are inevitable. To the dismay of the manufacturer, those flaws are never apparent until the machines reach the eager hands of the first purchasers. Strike two against premature buying.

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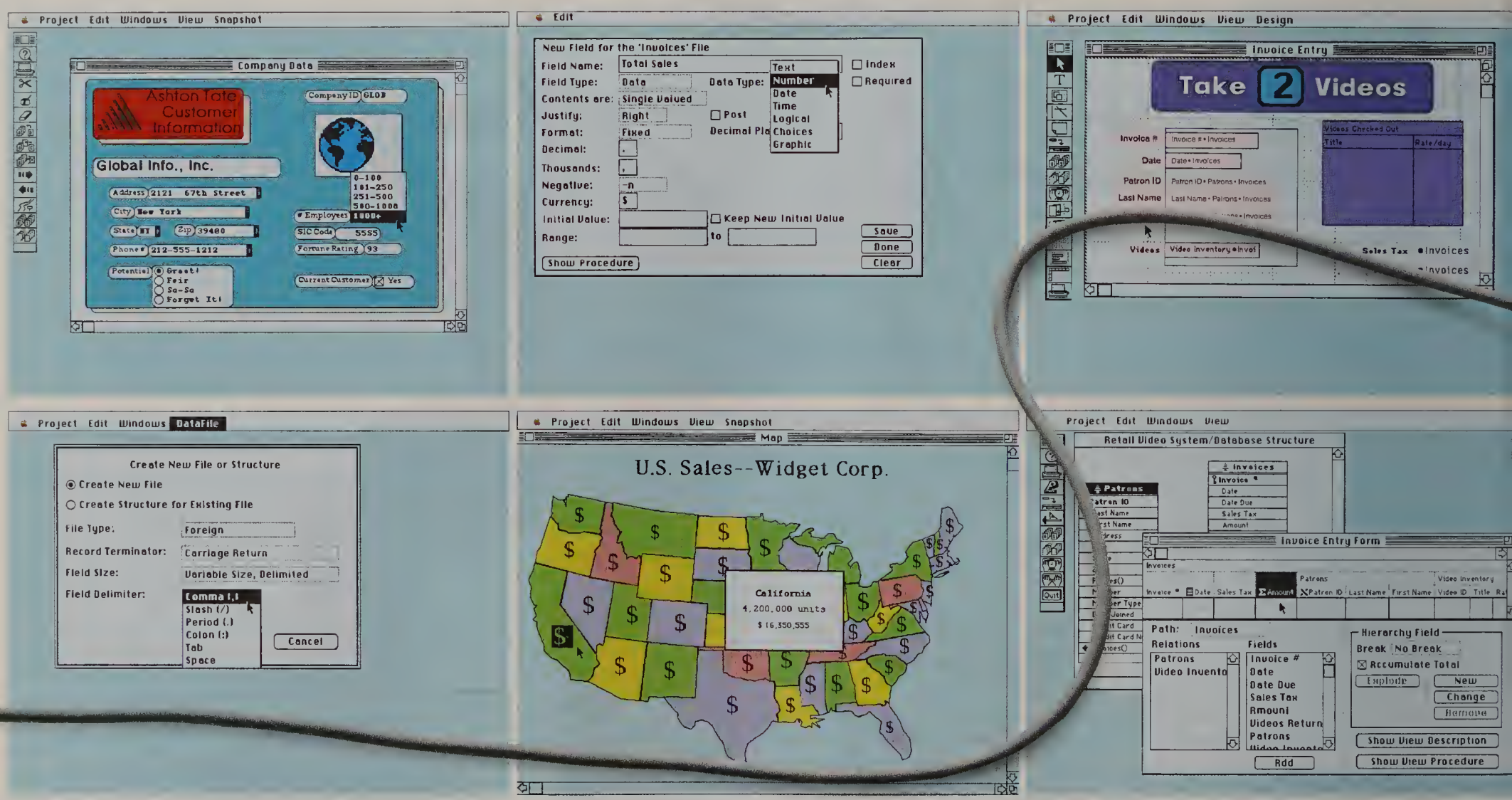

ounces the most used by man or mouse.

It's called dBASE® Mac.

And it's the most powerful relational database designed for the Macintosh.™

Especially since, unlike other databases, you can get that power without knowing a thing about programming.

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All without programming.

And all with the help of Macintosh's on-screen prompts and pull-down menus.

But if you want to go still deeper, the powerful dBASE Mac programming language will take you into a world of power and capability where no Macintosh has ever gone before.

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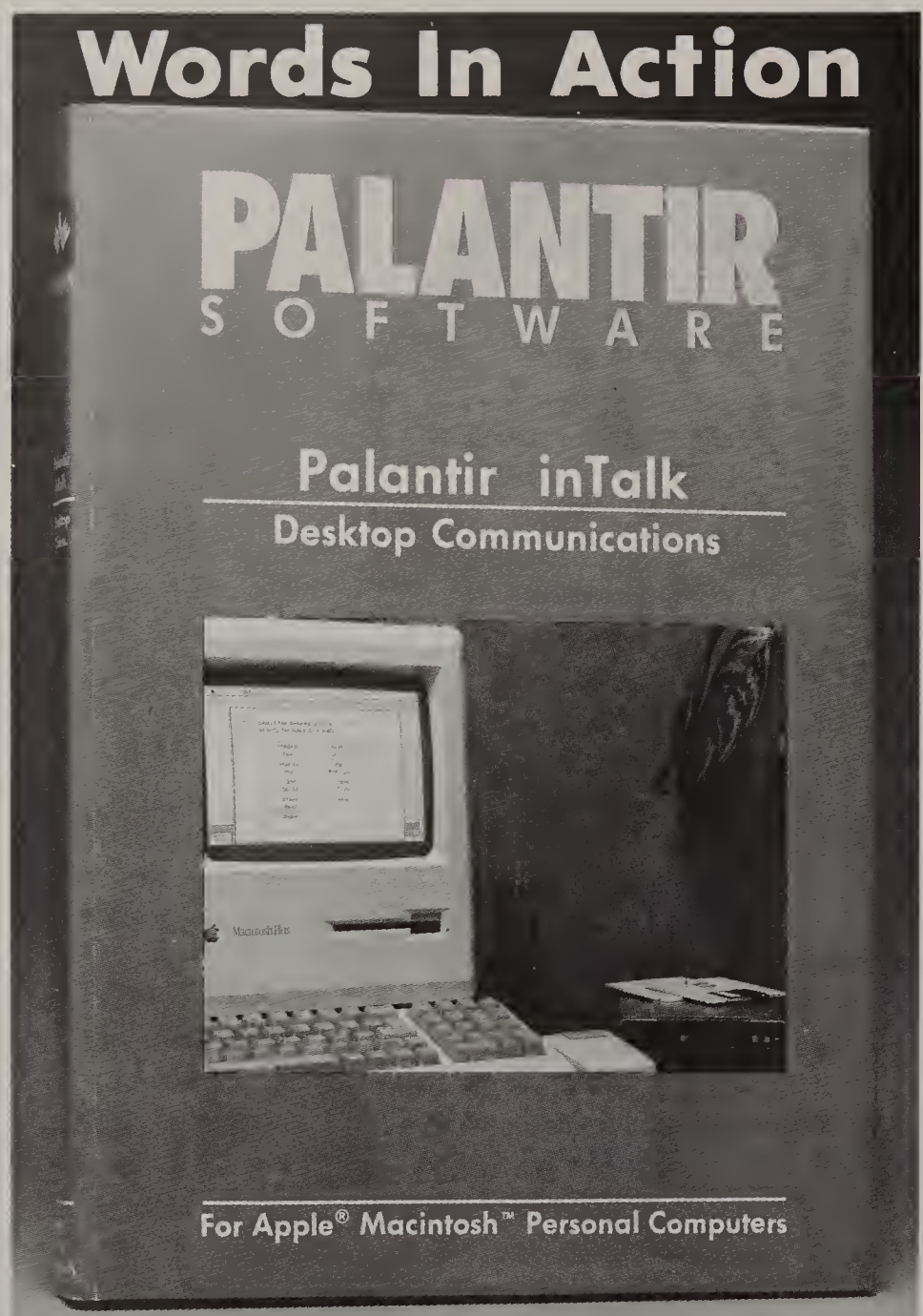
Words In Action



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The latest release of inTalk includes a variety of new high-powered features. The user-interface has been improved greatly allowing the windows to be resized and relocated. Use the text editor, CCL editor and terminal at the same time. The screen drawing speed has been improved. Function Keys are in their own window and can be moved or hidden altogether. The file transfer status window has been improved. The "Connect" protocol has been added for binary file transfers with CDC mainframes. A unique new feature has been added, allowing users to paste graphics and other data to a remote Mac Clipboard. The CCL command language has been given more power. Support for the new Mac SE and Mac II, and the new keyboards has been added.

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Finally, there is the danger that a freshly introduced computer will never find general acceptance. Instead of being able to outfit their prize with a cornucopia of innovative new software and peripherals, the orphaned owners might have to band together in die-hard groups. Witness the haunted minions whom you sometimes see wearing T-shirts that read "Lisa Lives."

Treacherous ground, indeed. Much like the uncharted land that awaited our ancestors more than a century ago. This was land that would inevitably be explored and tamed—but *somebody had to do it first.* Thus the ineluctability of our metaphor. The Macintosh II will never be the success it deserves to be unless volunteers risk being early buyers. Their fortitude—or foolishness—will enable everyday power users and workstation jockeys to eventually buy their Mac IIs when the computer's viability is beyond question.

How the Webb Was Won

By the time you read these words, that viability may well have been achieved. Stores should have ample inventories of Macintosh IIs—complete systems with color monitors, extra Random Access Memory (RAM), high-capacity hard disk drives, a selection of circuit boards to plug into the six internal slots, and shelves of updated software guaranteed to run on the computer. In other words, the Macintosh II world should be a bustling new outpost of civilization. But as I write this, in the heat of the summer, it is Frontier Days in Mac II land. Only in the past month has one been able to stroll into a computer store and examine a unit. Even so, at the Computerland I visited the other day, the salesperson kept referring to the thing as an "Apple II." I chalked it up to unfamiliarity.

The first Macintosh IIs were shipped on April 29. The very first one was delivered in May to Dick Webb, an audit partner of the Peat, Marwick, Mitchell accounting firm. Peat Marwick earned its pioneer spurs long ago, having ordered 3500 Macintoshes before the original Mac first shipped. "We wanted them as quickly as we could get them," says Webb, who is quite pleased with the 50 Mac IIs that had arrived by summer. He figures that the larger screen size alone makes the Macintosh II cost-effective for the computer scientists at Peat Marwick who have taken gleeful possession of the computers. Though the actual auditors at the firm will stick to the more portable Mac SEs, Webb

(continues)

says that the Mac IIs are seeing service not only as software development tools, but as secretarial workstations as well.

Still, it is perhaps instructive that Dick Webb's own Mac II, the first one off the line, now rests at home, where Webb uses it mainly to monitor electronic mail. In his office, he relies on a trusty SE. This may be more because of Webb's fondness for the original Macintosh's compact design than because of any dissatisfaction with the new version's capabilities: if there were risks to buying early, Webb has suffered them. Yet he says, "I don't think we've had a machine fail."

What Bugs Mac II

What, no downside? Could it be that the Mac II is domesticated upon release? Well, not exactly. There is, first of all, the price issue. True, since the Macintosh II runs many important programs of the industry's most impressive software base with unprecedented power and speed, it begins earning its keep immediately. But that initial investment is quite steep.

Two of the three dealers I spoke to have received so few units of the Macintosh II that they have seen no need to budge a buck from a system price that runs between $6000 and $8000. The one store that did discount wound up shaving $700 off the price of a $7000 configuration. Not bad, but small change compared to the discounts that will arise during the competitive Christmas sale days. Of course, in a year or so, the retail price of a reasonably loaded Mac II system will undoubtedly approach the $5000 mark.

Still, for those who want a Mac II now, price is less a consideration than getting in on the ground floor. They want to sign up for the excitement of being a pioneer, which this powerful machine provides in spades. But it also provides some headaches.

Here are some of the biggest problems in the early days of the Macintosh II.

■ No one was able to buy the much-touted Apple color monitor. Apple had contracted with Sony to build these $1000 wonders, but months after the Mac II shipped, the monitors were not available for love or money. The reasons for this failure were subject to heated rumor, but at least part of the problem was a miscalculation on Apple's part. The company somehow figured that most buyers of the Mac II (a machine so identified with full-color capability that some referred to it as "the col-

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MacIntosh™ Software Breakthrough:

How To Ship U.P.S.™ Without Paying For The Truck.

Daytona Beach, Fla.

It all started one day around 4:30 p.m.. As I sat in my office, I could hear the rumbling of the faithful UPS truck backing up in the shipping area. I felt sorry for the driver. We had a large shipment of heavy boxes that day and the temperature was in the 90's. The driver and our fulfillment manager were in for at least an hour of filling out forms.

That's when it hit me! Here I sit in front of my Mac, there's another Mac in accounting, one in customer service, and even one at the reception desk. **But we don't have one in shipping!**

"Surely someone has figured out a way to save time and money by using a personal computer for shipping". So I picked up the phone and called United Parcel Service. I learned that there are currently 22 UPS approved computerized shipping systems available. They range in price from $5,000 to $16,000! What you end up getting is some huge, expensive system with a whole bunch of hardware and software. (And as you've probably guessed, the systems are very IBM'ish.)

Undaunted, I continued my search. My Mac had slain the IBM Goliath in accounting, production, and customer service. It could do the same in shipping!

THE ANSWER.

I didn't want to pay $16,000 for a computerized shipping system. For that much I could buy my own UPS truck! The answer came in the form of a unique program called UPS ShipMate™ by Positive Works, Inc. It is designed for both the large, frequent shipper, and also for the occasional shipper. It's priced so that even individuals can afford it. The entire price is only $295, and best of all, it was designed for the MacIntosh. It does everything that the big systems do, except that you provide the computer and the scales. It does the rest.

SAVE TIME AND MONEY

No more forms to fill out by hand. No more charts or tables to look up. No more labels to fill out. All is done automatically at the touch of the mouse. UPS Shipmate™ fills out all tags, COD, AOD, manifests, and shipping labels. Paper work that used to take hours can now be accomplished in minutes. This software literally pays for itself in a matter of weeks by saving hundreds of man hours.

In addition, this unique program compiles complete customer files with all current data. The customer filing system boasts an auto lookup function that stores and retrieves information on all frequent shipments and customers.

Not only does UPS ShipMate™ do all the paperwork, look up all the zones, and figure all of your costs, it even helps manage your business. As a special feature, UPS ShipMate™ generates timely reports. It automatically keeps track of how much you're spending per day, per month, per year, etc. In addition, it calculates a cost comparison and graphically shows you how much you would have spent if you had sent the same packages by 2nd day air, by ground transportation, etc. You instantly know how much you are spending by date, by zone, by unit, and even by shipping method.

UPS ShipMate™ is fully approved by United Parcel Service and will handle all domestic and international shipping needs.

TO ORDER

UPS ShipMate™ is available for $295 *(or $449 w/ Filemaker Plus)* from Florida Mrktg. Int., Inc. 142 Cone Rd. Ormond Beach, Fla. 32074. To order by credit card call 904-677-1918. You will need to have a working copy of Filemaker Plus™ to work in conjunction with UPS Shipmate™. Complete documentation, users manual, and customer support number are included with your program.

UPS Shipmate™ by *Positive Works, Inc.*

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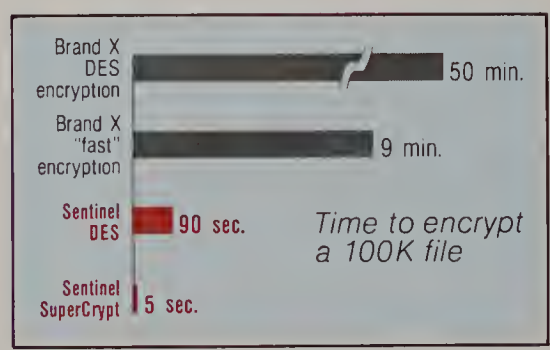
Would you leave this document out on your desk?

Then why leave it unprotected on your disk?

Everyone creates confidential documents — payroll analyses, bids, personnel records, to name a few. But documents sitting on the Mac desktop are as vulnerable as papers left out on your desk. Anyone can access your files when you are not around. And with the increased use of hard disks and networks, your data is now more accessible than ever. You need a way to guard your private documents from prying eyes.

SENTINTEL: Password Protection and Encryption.

SENTINEL is a data encryption utility that lets you lock your documents right on your desktop. Since password protection is easily circumvented by the determined intruder, Sentinel uses password *and* encryption strategies to protect your documents.



Sentinel's two encryption methods, DES and SuperCrypt, are so fast, they leave the competition in the dust.

For encryption (which actually scrambles the data on your disk), Sentinel presents a choice of two methods: *DES* or *SuperCrypt*™. Both offer speed as well as security. Our DES encrypts a 100K file in less than 90 seconds, SuperCrypt in just under 5.

Standard Macintosh Format.

Documents encrypted by Sentinel remain in standard Macintosh file format. They can be backed up, copied, transmitted over networks, or sent to remote sites by modem. But unlike all of the other files on your desk top, they can be unlocked and read only by someone possessing the correct password.

Easy and Natural to Use.

Sentinel also makes working with your secured files more convenient. Creating *Sets* of files allows you to protect multiple documents efficiently. You can add or delete documents to a Set, and Sentinel will lock or unlock them all with one password.

The *WorkSet* feature remembers which files have been opened at any time during a work session, and gives you a quick lock-down capability. Sentinel was designed to be unobtrusive and easy to use, making file security a natural work practice.

Price: $149.95.

Minimum system requirements: Macintosh 512e

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or Mac") would choose to configure their systems with black-and-white displays.

The initial orders, overwhelmingly for color monitors, put the lie to that assumption. Early Macintosh II buyers were told that they might have to wait months for their monitors. This dissuaded some, but others, with true pioneer verve, pressed on. Some chose to buy existing high-resolution monitors, some of which were built primarily for use with IBM PC-compatible computers. Most popular seemed to be the Sony Model 1302, which reputedly would use the same picture tube as the Apple model. The user-group networks were suddenly ablaze with hints on making custom cables to hook 1302s to Mac IIs.

But that approach might be a trail best not blazed, since the Sony 1302 has much less demanding specifications than the specially designed Apple monitor. Likewise, Apple engineers warn that those choosing another popular IBM-world monitor, the NEC MultiSync, are getting a product inferior to the Apple brand. Despite this, Apple–temporarily having no monitor of its own to sell–was sending its dealers instructions on how to hook up NEC MultiSyncs for Macintosh II customers. Only in August did Apple offer Mac II buyers the chance to take home monochrome monitors and then exchange them for color monitors when they eventually appear.

■ Apple was unable to supply adequate RAM to those who wanted to add to the measly megabyte supplied in the basic Mac II unit. One reason has something to do with the fact that Mac II memory chips run at a different speed from the chips used in the SE. In any case, I was interested to hear a dealer inform me that "if anyone tells you that they have RAM chips for the Mac II, they're lying." I felt bad for those power-hungry pioneers–a Mac II with only one megabyte is like viewing *Apocalypse Now* on a Watchman TV.

■ Some Macintosh software didn't work on the Mac II. Nor did the drivers for some hard disks. In most cases the manufacturer of the program or hard disk was feverishly writing fixes that would remedy the problem. But again, why pay more to buy early when the machine may not run your favorite program, or even your hard disk?

■ Some people had trouble with–of all things–the battery. On previous Macintoshes, this would not have been a crisis: one would simply pop open the compart-

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ment on the back and replace the battery, for under $5. But the Macintosh II has an unorthodox approach to its lithium battery. It is actually *soldered* to the system board. Those without degrees in microcircuitry would be best advised not to mess with it.

Wait—it gets worse. On the Mac II, the battery's tasks not only include keeping track of the time, date, and various settings while the power is off; a live battery is essential to the process of turning on the machine. So a dead battery means a dead computer. In theory a battery is good for seven years, but as one Apple engineer told me, "No one really knows how long it will last." This fellow guessed that with the level of field service being what it is, eventually people with dead batteries will take their inert Mac IIs to their dealers, who will remedy the problem by replacing the entire system board—several hundred dollars for a worn-out, low-cost part.

No Pain, No Gain

You're reading this in November, of course, and all but the last problem is expected to be resolved. (Apple has been holding firm to the contention that the soldered-in battery is more feature than failure.) But the pioneers had to cope! Some of them did it with a fervor that implied that overcoming hardships was as important to these folks as enjoying the pleasures of this neat new machine. For instance, one chap told me of a triumphant cross-country search that culminated in locating the one store in the country that provided a cable to connect a certain monitor to his Mac II. Or take the case of the enterprising hacker who sat down and wrote a patch that made *Microsoft Works,* previously a Mac II washout, work on the new machine. The patch was in circulation for some time before somebody told Microsoft of its existence.

So be grateful to the pioneers—but don't worry too much about them. When the Macintosh II reaches its final perch on the pinnacle of the personal computer world, the early buyers will be sure to remind us of their perspicacity. Whether or not it was really worth the quick purchase, only they will be able to answer. But before you line up to be one of the first buyers of the Macintosh III, whenever that model shows up, please consider this electronic missive I received from Andy Reese, a candid pioneer from Texas:

"I ordered a Mac II one week [after its introduction and] took delivery of it in late June. As President of our user group, I have usually taken the leap on the latest technology, serving as a guinea pig for our members.... The Mac II I bought had one floppy, no hard disk, and a monochrome monitor (on loan from the dealer until the color one comes in). The theory behind no hard disk was that I would get a 45MB MacBottom to connect to the Mac II at the office and then take home to use on the SE at night. Good theory...I soon discovered myself that the 45MB will not work on the Mac II [yet]. I set up the MacBottom and am using it on the SE for now.

"All this has put quite a damper on my enthusiasm for the Mac II. I use it as a terminal emulator at work. That is all it has been doing for the last two weeks.

"When I am asked for advice on what machine to buy, I find out what kind of user the person is. If they are first-time purchasers, I strongly steer them away from the Mac II toward the SE. If they are power users, I tell them that the machine is nice, but they should wait for the price to drop or for many of the problems to be resolved first."

That was in July. I bet by now Reese is bragging to his friends what a smart purchase he made. □

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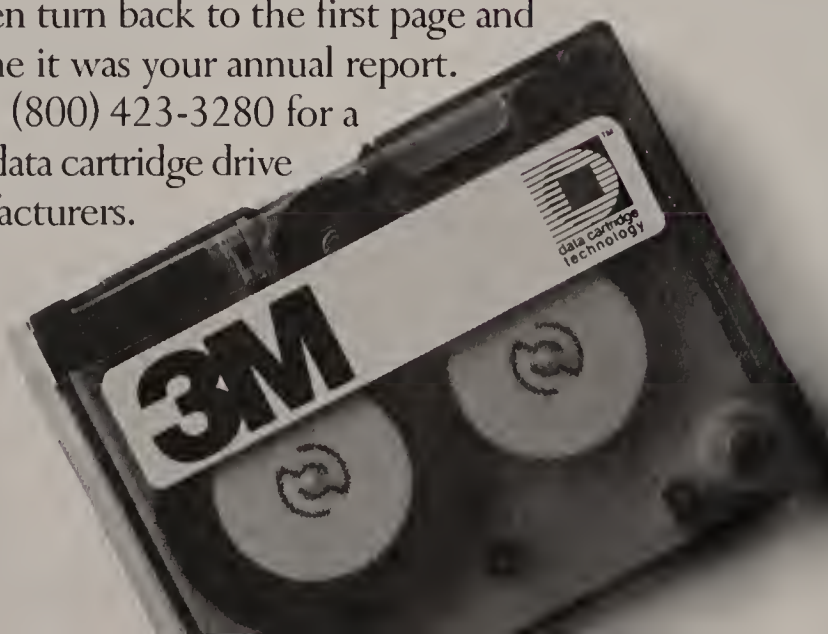

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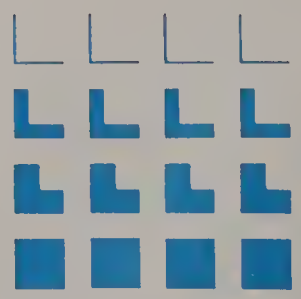

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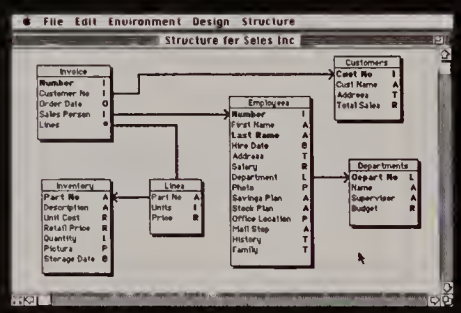

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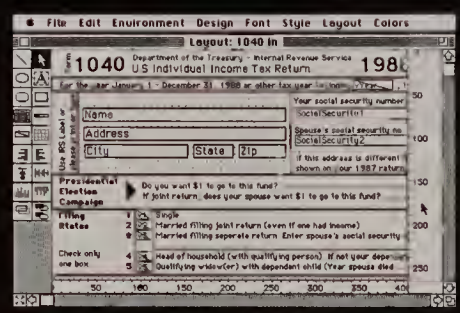

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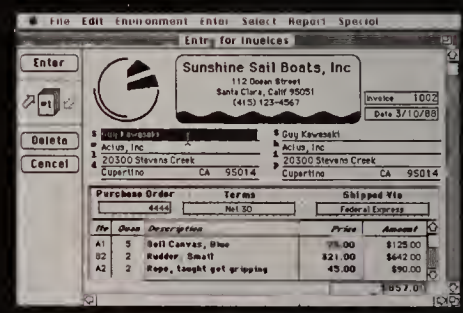

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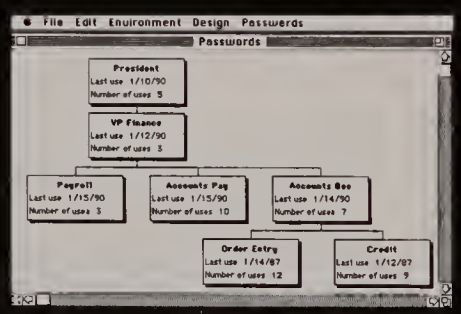

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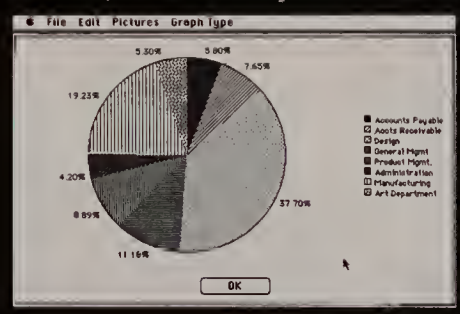

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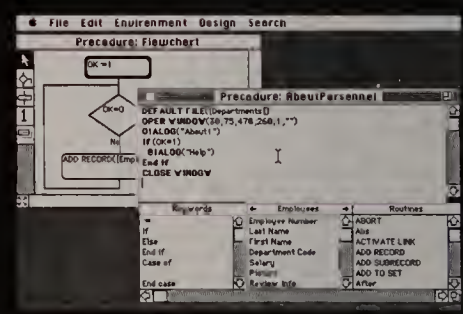

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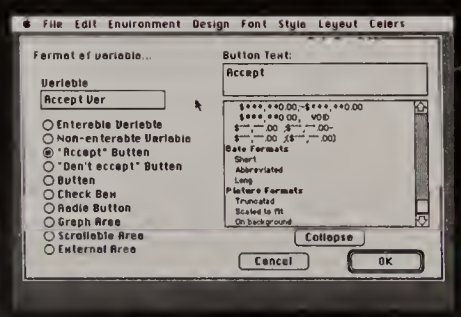

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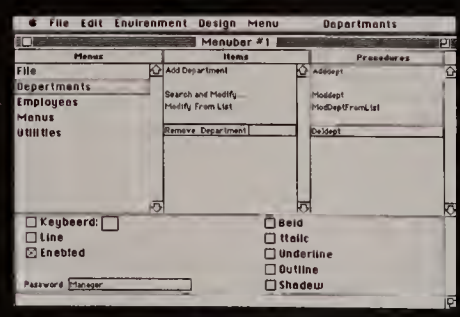

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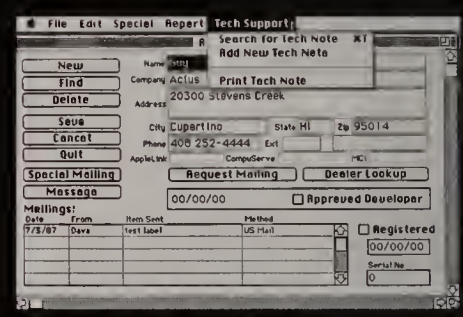

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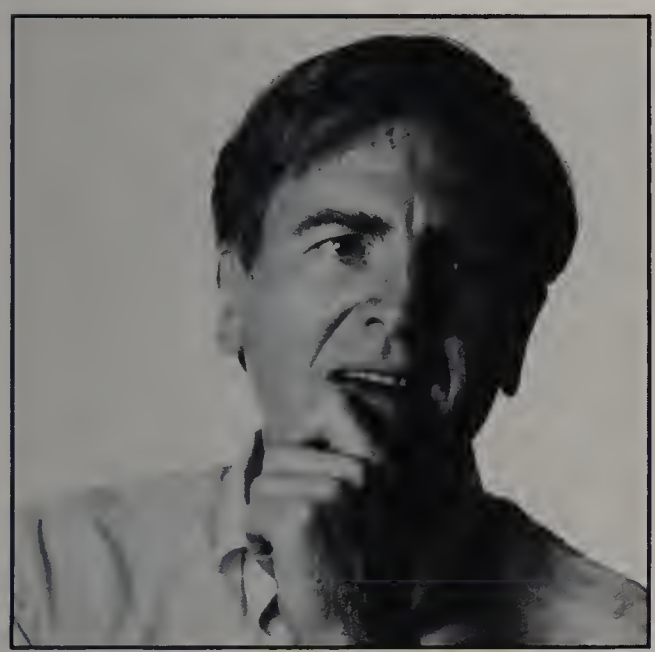
An interview with John Sculley, chairman and CEO of Apple Computer



John Sculley became president and CEO of Apple Computer in April 1983, less than a year before the introduction of the Macintosh. Since he became chairman of the board in January 1986, Apple has posted the highest earnings in its history and now ranks in the Fortune 200 list of America's largest corporations. Before joining Apple, he was president and CEO of Pepsi-Cola Company; during his tenure the soft drink passed Coca-Cola and became the largest-selling consumer product in the nation's supermarkets. Though Sculley has concentrated on business management, his original major at Brown University was in architectural design, and his interest in design continues. In his new book, Odyssey: Pepsi to Apple—A Journey of Adventure, Ideas and the Future, *he tells the story of his life in business. Here he comments on the changes Apple has undergone and considers the personal computer's future in the rest of the 1980s and into the next century.*

How do you compare what you did at Pepsi—leading it to surpass rival Coca-Cola—to what you want to accomplish at Apple?

The strategy was somewhat similar. Pepsi was number two in the soft drink industry, but our goal was never to take first place by taking existing customers from Coke. Instead of a strategy that required the market leader to fail, we decided to take market share from all the other soft drink companies. We worked to create new markets and get more than our fair share of the growth with innovations in advertising, packaging, and merchandising. We knew Coke would follow suit, so we had to keep innovating. At Apple, we want a share of the business market, but not by taking over IBM's markets. We want to create new markets and get a large share of this growth. Apple has to leverage technical innovations and play a major role in shaping the direction of our industry. That's been our strategy for the last two years.

Why were you chosen to come to Apple?

I have always been intrigued by powerful ideas. Steve Jobs and I hit it off well. It seemed that between the two of us we had the combination of talents needed to make Apple great in the future. I had the marketing and business experience, and Steve had the technology and dreams. I was as excited as he was in terms of what Apple could be.

Your book *Odyssey* deals with both dreams and business.

I wanted to write a different kind of business book. Much of it is a narrative of my adventure in going from Pepsi to Apple, and my relationship with Steve Jobs and others along the way. It's also a book about my mistakes and what I learned from them. In other parts of the book, I project myself and Apple into the 21st century. There may be a second Renaissance in the United States brought about by a combination of global competition, threats to America's affluent middle class, and opportunities for individual innovation. I talk about information technology and how I believe it will affect schools and the economy by nurturing a new age of the individual. There are some warnings about our tendencies to focus on the short term, which could bring on crisis and important changes. But the book ends on an optimistic note, with the recognition that crisis can produce many constructive changes—including adoption of a longer-term perspective.

Does Apple need to become a more diversified high-technology company, in the same sense as General Electric or Hughes?

Our long-term vision at Apple is still very "personal computing." We see the computer industry growing and thriving, and the emphasis of computing will shift steadily toward what Apple is already good at. The epicenter of technology shifted in the 1980s from the mainframe to networks. We're organizing and leading a shift to the user. To move toward that goal, we are committing an amount of resources that is large by any standard. We are already spending hundreds of millions of dollars on research and development. That's a large percentage of revenue.

But we never want to be in the position of renting our primary technologies from someone else. So we have to spend to keep inventing and revising proprietary technologies.

(continues)

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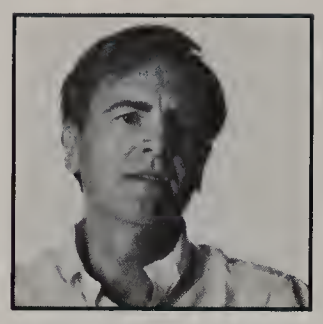

The information age is shifting the main role in society back to the individual.

One of the fears raised in the late 1970s was that many people would become information poor, disenfranchised by their lack of access to information. Is Apple concerned about that?

Apple has done a lot to make accessing information more affordable, but we have to reshape our outlook still more. We can draw distinctions between information and knowledge, which is the real objective. We must make knowledge itself more accessible by creating tools that deliver it efficiently and inexpensively.

I see two important shifts early in the 21st century. First, the role of the individual will be more important than in the 20th century; the information age is shifting the main role in society back to the individual. Knowledge is power, and making more knowledge available to individuals makes them more powerful. We have to allow computers to give power to individuals, so that they can become more creative and productive. The other important shift is in technology—everyone is trying to develop a better networking strategy. When that happens the epicenter of computing will shift. Until recently the economy of the United States was the global focus. That has shifted, and in the next century the focus will not be on any single nation, but will move toward a global economy, a fluid network of resources and information. The issue is how the U.S. will fit into this network.

What is your vision of Apple's 21st-century technology?

All the major technologies to build revolutionary machines for the 21st century exist today or will be in motion by the end of the 1980s. The performance of the technologies will improve dramatically. Microprocessors of the 21st century will be 100 times faster, yet cost the same as today's. They will process the software loaded with artificial intelligence, sophisticated 3-D image processing, high-resolution animation, speech recognition, and voice synthesis. Full-motion video—with image quality far better than current television sets—will be what computer users routinely expect.

The problem is the growth of information; the amount of information doubles every two years. So the ultimate aim of computers will not be to create more information. We need the ability to navigate in real time across vast expanses of information. So it is especially important that we develop a new perspective. Information is an interim step to the ultimate goal of knowledge. We have an opportunity in the early 21st century to create breakthrough products as important to people then as movable type was to people in the beginning of the Renaissance.

After Gutenberg developed movable type, it took more than a century of development before it had an impact on society. In 1360, 1 out of every 100 Europeans could read, but by 1500, 80 out of every 100 could read. Gutenberg's invention democratized knowledge in the process.

Apple's near-term challenge is to create an ancestor of the tool that might be vital to us in the next century.

What is your vision of the 21st-century personal computer?

I developed a term, Knowledge Navigator, to describe it. While today's computers take users to the doorsteps of libraries and institutions, the Knowledge Navigator will drive us through them. By the 21st century, we will have the installed base to make the computer a mass personalized knowledge-based system. It will make incredible quantities of information understandable—and personalized. It will customize information automatically, because it will have the ability to "learn" about a user's habits and preferences. It will have the independent

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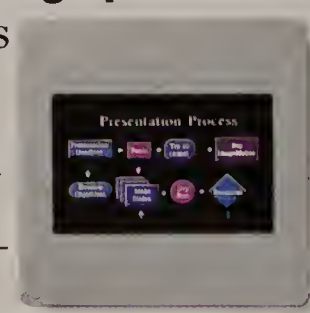

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We are still at the machine-enthusiast stage in the personal computer industry.

ability to search databases and perform content analysis on information. It will do a lot to transform information into personally tailored knowledge, thus improving the payback of companies' investments in computers.

The physical appearance of the 21st-century personal computer would be more like a pilot's cockpit than today's machines. A large flat display screen might have navigational joysticks at both sides, allowing you to steer through menus, windows, and stacks. It will instantly accept or provide data in any mode you like: text, graphics, video, speech.

The key benefit of the Knowledge Navigator is that it will encourage learning and creativity. By the 21st century, intelligent information networks will make a world of knowledge much more accessible. Distributed databases will be widely installed. Brick-and-mortar libraries will give way to electronic ones. We will have superhighways of knowledge, and they will have as much impact on the American economy as the railroads did in the 1800s. The Knowledge Navigator will be the tool of choice for helping us understand better. It will be capable of helping us explore, connect concepts, and compare subjects.

Obviously, it will make learning experiences much more interesting for students. Not only that, but teachers will boost their own self-esteem because they will have more power to shape education. Students will be drawn into the educational experience, once it moves away from the mechanical, memorization-oriented path so many schools are on.

In business, the Knowledge Navigator will free the participants in the 21st century's dynamic global economy to spend a greater portion of time experimenting, simulating, creating, and innovating. In short, workers will be able to create more options for adding value—a crucial concern for the industrialized economies of the coming era.

Will you be the one to build the Knowledge Navigator at Apple?

My sense is that we are doing the right things in order to be able to build the 21st-century personal computer. I'm satisfied with Apple's direction, which is mostly what a CEO is concerned with. When I came here we were looking 2 to 3 years ahead; now we're looking 15 years ahead. We bring together people who have special talents—they don't have to be in computer science. But we want to attract the best people, like Jean-Louis Gassée, Larry Tesler, and others who know computers and have a commitment to this vision. That is how to build an organization that will make the Knowledge Navigator the legitimate descendent of the Macintosh.

Apple's current reorganization looks more extensive than the infamous one of June 1985.

Yes. We made as many changes in the first six months of this year as we made in all of 1985. The difference is that in 1985 we were in a crisis, and now we are changing to take advantage of our opportunities. It is part of our shift at Apple in the last two years, from selling primarily to consumers and educators to new areas of focus, primarily increasing business sales.

Many developers originally questioned Apple's intent to move Claris out onto its own. Are you actually accelerating the pace of independence for Claris?

We intended to do that from the start. It is a sort of prototype for things we hope to do. As opportunities appear, we will spin out businesses to fill gaps in the market that are strategically important. If Apple is to be on the leading edge, things in it and its infrastructure must change too. That's why we picked our executive vice-president and

(continues)

Super *your* Mac:

How to give your 512, Plus, or SE the hard disk performance of a Macintosh II. DataFrame *highest performance* drives.

The new Macintosh II features a disk technology called 1:1 interleaving for highest performance.

The DataFrame XP family of hard drives has delivered that same 1:1 performance, *to any Macintosh*, for over a year now.

Who needs faster disk performance?

Everyone. The faster the disk, the faster the Mac system. Faster program loading, faster operation, faster saves. You work faster, because you wait less. That's why InfoWorld concluded DataFrame's speed "shows just how good the Mac can be."

". . . leaves the others in the dust."

InfoWorld compared. After measuring the DataFrame to be *significantly* faster than the Macintosh SE internal hard drive, they went on to compare DataFrame to the fastest drive they'd seen for *any* computer. The result: "It left that pony in the dust, too."

InfoWorld's conclusion: "the fastest drive we've tested."

Loaded with great SuperMac software—including SuperLaserSpool and DiskFit.

Says MacWorld, "SuperLaserSpool is the most complete and well designed spooler available for the Mac." And DiskFit earned the highest rating MacUser ever awarded a backup program.

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The same 1:1 interleave that makes DataFrame so fast also makes it truly portable. Swap it between any Mac II, SE, Plus, or 512—with *full* Mac II disk performance. No other drive offers this interchangeability.

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Equipped with a DataFrame, your 512, Plus, or SE will *outperform* Apple's new, hard-drive SE. And your Mac II will perform to its fullest potential.

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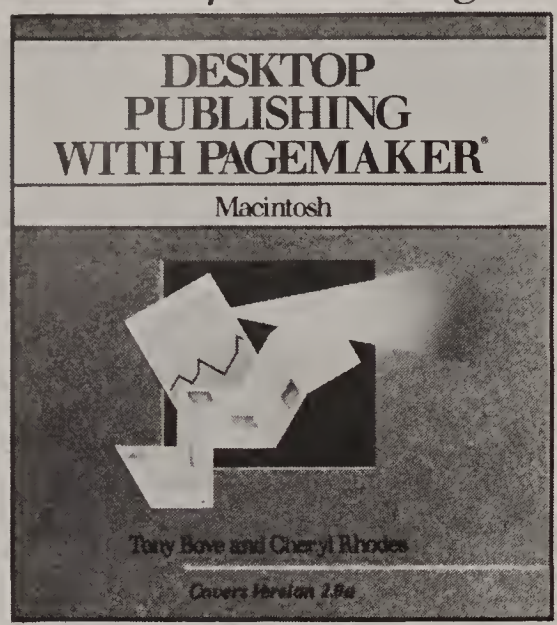
From the editors of
Desktop Publishing



This new book tells you everything you need to know to get going with PageMaker, the most popular desktop publishing software on the market today. Two experts in the field explain all the techniques and commands needed for design, layout, typography, and graphics and provide tips and shortcuts that make desktop publishing even easier to master. IBM version also available. $19.95
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The Mac II ranks as an industrial-strength product for desktop publishing.

some of our best middle management to direct the new company. They have hired people like Yogan Dalal, a codeveloper of the Ethernet protocols.

Why have you compared the computer industry today to the auto industry in its early years?

It's a good analogy. If you think back to the auto industry's early years, it was supported by machine enthusiasts and made a slow transition to a mass personal transporation industry. That occurred only after technology was made invisible to the user–like the automatic transmission. And gradually we created infrastructure–service stations, highway systems, services.

We are still at the machine-enthusiast stage in the personal computer industry, but in the next century we are sure there will be a transition to mass personalized knowledge-based systems. And that transition will happen only if the technology is invisible enough that the "drivers" have to think only about where they're going.

What do you enjoy doing when you're not working at Apple?

I draw and design. Since I was young I've had an interest in inventions. One of my first inventions–I talk about it in my book–was a color television cathode-ray tube with a single electron gun. That was in 1954. I had a patent application, but Dr. Ernest Lawrence, the inventor of the cyclotron, had a basic patent that covered much of the technology. So my application was denied. He filed his about two weeks before mine. He sold it to ABC-Paramount, which in turn sold it to Sony. Now that technology is the basis of their current line of Trinitron products. I was also a ham radio operator and built my own transmitters and other equipment.

Were you a boy wonder?

Well, a dreamer. I love learning. It's almost an accident that I ended up in business and marketing. At college I studied architecture and industrial design. If there had been a Silicon Valley when I was graduating from school, I'd have been here fast. That's another reason things with Apple worked out.

Desktop publishing has been lauded for some time, but companies attempting to use the current products as heavy production tools are finding that they're not so great. What is a realistic view of desktop publishing?

The reports we get for DTP tell us that there are no limits for the market. The Mac II ranks as an industrial-strength product for professional electronic composing, while the SE and the Plus can serve as personal text- and graphics-editing stations.

We are now seeing the second generation of desktop publishing software–there are new releases from Interleaf, Aldus, Letraset, and, in the area of desktop presentations, from Forethought. So the tools are approaching the quality of dedicated electronic publishing systems.

One System software area that needs some advancement is the graphical user interface–especially in light of multitasking system software like MultiFinder.

In the coming year people will see how the graphics environment is moving. We made a conscious decision to direct the early shipments of Macintosh IIs to developers so they can take advantage of its performance and be able to release a number of exciting new products this year. At the same time, developers will announce improvements to solutions for the Macintosh Plus, SE, and II, so people will see how we're building on the technology.

(continues)

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Back to Basics was written specifically for the Apple Macintosh, not simply converted from another computer version. It uses the Macintosh interface (mouse and visual icons) for system operation and groups functions into on-screen "file drawers" for organization and ease of use.

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Back to Basics Invoicing will soon be available for the Apple Macintosh at an introductory price of $95.

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• Apple Macintosh 512K or Plus with two disk drives or hard disk.

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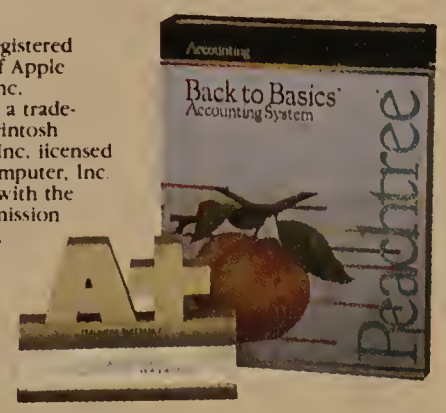

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HyperCard will stimulate tremendous software development.

What are the implications of *HyperCard* for user programmability?

HyperCard is an extraordinary and innovative new Macintosh technology. It's really an erector set of authoring tools to allow both experienced and beginning programmers to organize information in highly intuitive and unstructured ways. It's part of the dream to make personal computing very, very personal. The product could have an impact more significant than Microsoft BASIC did in the 1970s for the Apple II. Bill Atkinson worked on it for two years. His work resulted in a product that will promote a new way of organizing thought.

We hope it becomes a root technology that shows up in a very advanced form in our personal computers of the next century. It's already on a track that will make it a great development environment for CD ROM.

How do *MacApp* and *HyperCard* compare?

When the Mac was introduced there was no easy way to program the machine. By making the Macintosh easy for users we had to make it harder for developers. It took a while before programming tools were available. You had to develop on a VAX or a Lisa to create Mac programs, a situation similar to Microsoft's OS/2 today. In the case of *MacApp* we took object-oriented programming, like Alan Kay's SmallTalk, and tried to make the process of programming better.

MacApp is an extension of application generators that employ the sort of concepts envisioned in SmallTalk for programming without code. Only icon representations on the screen are linked together. This is extremely attractive in that it decreases the time it takes to program the Mac. It gives access to the Toolbox, which is extremely rich, with over 400 calls available to the developer.

HyperTalk is the language for *HyperCard,* which is a new metaphor for programming the Mac. The metaphor is stacks of cards, and each card can contain text, graphics, sound, or commands. You can link a card to any other card. This opens up a new group of people to ideas that have been discussed since Ted Nelson conceived Hypermedia in the 1960s.

It means that you can develop applications that let you use information in a natural way while taking advantage of the Mac's power, as opposed to using information in the way that the computer wants you to. All major breakthroughs in personal computing have shared this: they let you accomplish in a more efficient manner something you were already doing. My sense is that *HyperCard* will stimulate tremendous software development.

What about Apple's fax modem and other new products?

Adding those products is a clear indication that we are taking desktop publishing technology to higher levels. The long-term direction is to do everything from text design to the entire design process.

The fax modem we've announced is an important component of our plan. It turns a Macintosh into a facsimile station, which moves documents around quickly. It's not always practical to put documents in a binder and send them by Federal Express; you need to transmit them over long-distance networks as easily as putting text in Telex or sending it over E-mail.

When we combine communications and desktop publishing so that their capa-

(continues)

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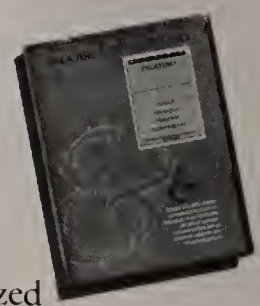

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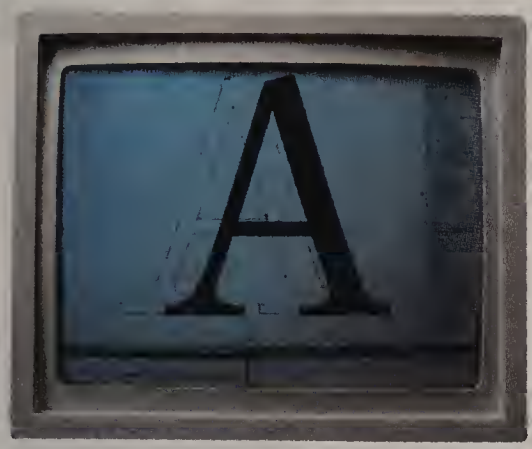

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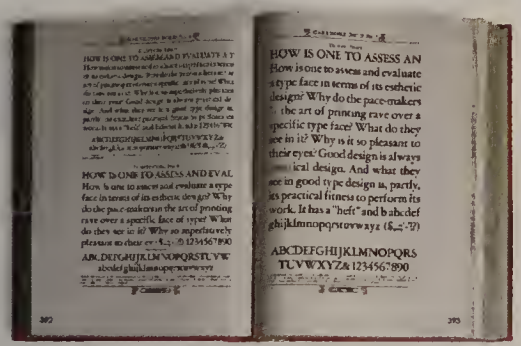

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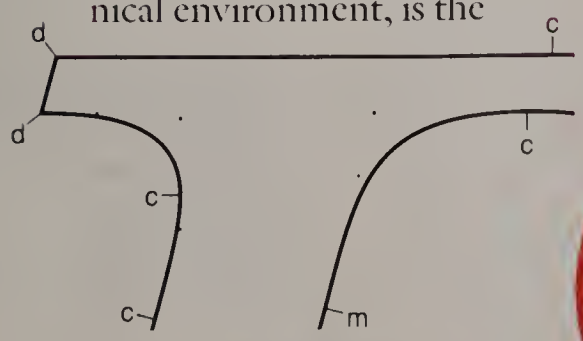

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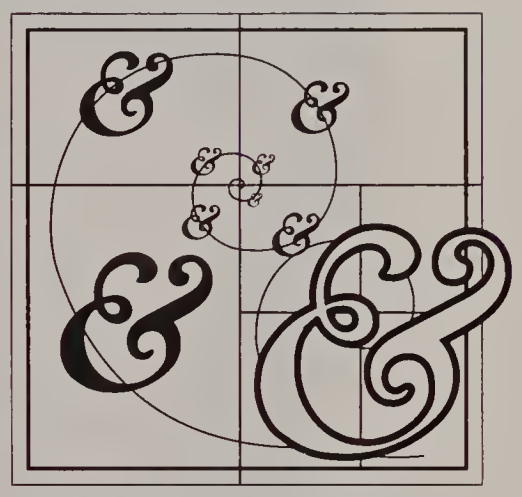

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Programs & Peripherals

Picks of the Month

Canvas by Deneba Software

Canvas is an new graphics program that will revolutionize the way you draw. You can seamlessly integrate MacDraw objects, high resolution 300 to 2400 dpi images, PostScript and MacPaint graphics in a single document. *Canvas* supports all the capabilities of MacDraw and MacPaint, views your drawing from 3.125% to 3200% and has "WYSIWYG" text editing with powerful commands for special effects.

Canvas ..... **125.**

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Numeric-Turbo by Cambridge Automation

Now you can cut your data input time in half. ***Numeric-Turbo***, a new high-speed input device, combines the fast response of a track-ball with a full-scale numeric keypad. It includes cursor keys and direct function keys, so you no longer have to use Control or Shift on the Mac keyboard for function entry. Upgrade your Mac 512/128K with *Numeric-Turbo* to equal a Mac-Plus with the convenience of a track-ball.

Numeric-Turbo ..... **99.**

SYSTAT 3.1 by SYSTAT, Inc.

SYSTAT 3.1 is the most comprehensive statistics package ever written for the Macintosh. Most Mac statistical packages call themselves "professional" or "comprehensive". But, feed them some *real* problems, and you'll discover how toothless they really are. They can't do multivariate procedures, analyze financial time series, fit nonlinear models or compute large, multi-way cross tabs. That's why, if you're serious about statistics, sooner or later you'll end up with *SYSTAT 3.1.*

SYSTAT 3.1 ..... **459.**

ComServe by Infosphere

ComServe is a modem sharing application that transparently runs in the background of a Macintosh. It allows you to offer telecommunications services to everyone on your Appletalk network. With AppleShare compatible *ComServe*, you no longer need a modem at each Macintosh (with all the wiring jungles and line charges) to gain network-wide access to modems, mainframes and minis. Clone your modem now with *Comserve* and eliminate the need for costly dedicated hardware!

ComServe ..... **125.**

Laser F_X by Postcraft International Inc.

Laser F_X is a one-of-a-kind utility program for desktop publishing. It allows you to take any Postscript font and use the 30 special effects included to create dazzling typographical triumphs. You can rotate, skew, shade, shadow or outline text. Choose to print directly from *Laser F_X* or paste into Quark XPress, Ready, Set, Go! 3, Page Maker 2.0 and most others. You can use any PostScript font, either downloadable or resident in your Laser Printer, to create effects that add extra pizazz to your communications. With *Laser F_X* your desktop publishing will never be the same!

Laser F_X ..... **119.**

MacMoney by Survivor Software Ltd.

Do you know how much you spent traveling so far this year... how much that dog has cost you...whether your company has reimbursed all those business expenses? ***MacMoney*** answers these questions easily. All you have to do is enter checks, deposits, credit card purchases and cash transactions. You can enter these transactions and disburse the amounts over up to eight categories, print checks, print reports or export information for further analysis. With *MacMoney* you can create a simple or complex system - you're the boss - it's your money.

MacMoney ..... **41.**

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Business Software

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Spelling & Grammar Checkers

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Doug Clapp's Word Tools	42.
A.L.P. Systems MacProof 3.0 *(Requires MacPlus)*	99.
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Thunder! *(Interactive Spelling Checker)*	32.
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Spelling Coach 3.0 Professional *(Adds Definitions & Thesaurus)*	129.
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WorksPlus Spell	38.
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Word Finder *(Synonym Finder)*	39.
Working Software, Inc.	
Spellswell Spelling Checker & Proofreader 2.0	44.
Spellswell Medical Dictionary *(35,000 Medical Terms)*	58.
Lookup *(Makes Spelling Suggestions)*	32.

Desktop Publishing

Aldus Corporation PageMaker	399.
Boston Publishing Systems	
The MacPublisher III	139.
Letraset Ready, Set, Go! 4.0	289.
Postcraft International, Inc.	
Laser FX *(Typographical Special Effects for Desktop Publishing)*	*Special* 119.
Quark, Inc.	
QuarkXPress	499.
Solutions, International	
Glue *(Adds "Print to Disk" Capability)*	41.
Super Glue *(Graphics Integration Package)*	59.
Target Software	
Scoop	399.

Accounting Packages

Chang Labs	
New Enhanced Version III Modules!	
Rags to Riches GL, AR, or AP	125.
Rags to Riches Three Pack- *(GL/AR/AP)*	299.
Inventory Control	243.
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Digital, Etc.	
Turbo Maccountant V2.0	259.
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Monogram Dollars & $ense	81.
Peachtree	
Back To Basics Three Pack *(GL/AR/AP)*	139.
Survivor Software MacMoney *(Financial Planner)*	*Special* 41.

Statistics Packages

BrainPower	
StatView 512 Plus	179.
Cricket Software Statworks	77.
Systat	
Systat 3.1 *(Specify Mac 512K, MacPlus, or Mac II)*	*Special* 459.

Graphics Software

Altsys Corp. FONTastic	27.
FONTastic *Plus*	49.
Fontographer 2.2	245.
Ann Arbor Softworks Full Paint	53.
Apple Computer MacPaint	99.
Broderbund Print Shop	39.
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Fluent Fonts 2.0 *(Two-Disk Set)*	29.
Fluent Laser Fonts Vol. 1-15 *(ea)*	48.
Deneba Software Canvas 1.0 *(Includes Desk Accessory)*	*Special* 125.
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World Class Fonts! Vol. 1 or Vol. 2	28.
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WetPaint Vol. 1 or Vol. 2	28.
WetPaint *(Both Volumes)*	49.
Enzan-Hoshigumi USA	
MacCalligraphy 2.0	115.
Japanese Clip Art Scroll 1 *"Heaven"* or Scroll 2 *"Earth"*	59.
Japanese Clip Art "Borders" Scroll	72.
LaserWare, Inc. LaserPaint	319.
LaserWorks	199.
MacroMind VideoWorks II	129.
Miles Computing	
Mac The Ripper, Orchestra of Fonts, People-Places-Things, or Taking Care of Business *(each)*	27.
Mindscape ComicWorks	48.
GraphicWorks 1.1	64.
Olduvai Software	
Post-ART *(Three Disk Set)*	34.
Silicon Beach Software	
SuperPaint	99.
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The Curator *(Catalog Your Art)*	95.
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Click Art Letters I, Letters II, Personal Graphics, Publications, Effects, Business Image, Holidays or Christian Images *(each)*	28.
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CAD Products

Apple Computer MacDraw	159.
Challenger Software	
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Silicon Beach Software Super 3D	199.

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Baron's Baron's SAT	35.
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1st Byte/Electronic Arts	
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Mathtalk Fractions, First Letters & Words, or Smoothtalker	31.
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KidsTime or TimeMasters	28.
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Mindscape Perfect Score SAT w/The Perfect College	46.
Nordic Software	
MacKids Educational Programs *(each)*	*Special* 29.
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Passport MIDI Interface	95.
Master Tracks Pro	259.
Rubicon Publishing	
Dinner at Eight-Silver Palate Bundle	52.
Simon & Schuster Typing Tutor IV	38.
Springboard	
Early Games for Young Children	28.
Easy as ABC	28.

Game Software

Accolade Hard Ball	24.
Activision Shanghai or Hacker II	24.
Hacker	16.
Portal	32.
Artworx Bridge 5.0	20.
Avalon Hill Mac Pro Football	30.
Broderbund Ancient Art of War	27.
Bullseye Software	
Fokker TriPlane Flight Simulator	34.
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Electronic Arts Starfleet I	37.
Venture's Business Simulator	49.
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EPYX Winter Games or Sub Battle Simulator	24.
Hayden Software Sargon III	29.
Infinity Software, LTD.	
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World Cup Soccer	27.
Go	23.
Infocom	
Ballyhoo, Beyond Zork, Bureaucracy, Hollywood Hyjinx, Leather Goddesses of Phobos, Moon Mist, Nord & Bert, Plundered Hearts, Stationfall, The Lurking Horror, Trinity, or Zork I *(each)*	25.
Hitchhiker's Guide to The Galaxy	19.
Zork Trilogy	45.
Microsoft	
Flight Simulator 1.0	32.
Miles Computing Inc.	
The Fool's Errand or Downhill Racer	27.
Mindscape	
Balance of Power or Crossword Magic	32.
Deja Vu: A Nightmare Comes True	32.
King Of Chicago or Shadowgate	32.
The Uninvited or Siboot	32.
Practical Computer Applications	
MacGolf 2.0 or MacRacquetball	36.
MacCourses	34.
Psion	
Psion Chess *(3D & Multi-Lingual)*	31.
Sierra On-Line	
Space Quest	32.
King's Quest I, II, or III *(each)*	32.
Silicon Beach Software	
Apache Strike or Beyond Dark Castle	32.
Enchanted Scepters	21.
Dark Castle	28.
World Builder	41.
Simon & Schuster	
Star Trek *(The Kobayashi Adventure)*	24.
Sir-Tech Mac Wizardry	35.
Sphere, Inc.	
GATO, Orbiter, or Falcon	26.
XOR Software NFL Challenge	69.

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Disk Drives/Hard Disks/Upgrades

AST Research
AST fAST-20 — 859.
20 MB External Hard Disk for Macintosh Plus, SE and Mac II.
AST-2000 — 1399.
20 MB External Hard Disk with 20-MB Cartridge-Tape Backup for the Macintosh Plus & SE.
AST-4000 — 3699.
74 MB External Hard Disk with 60-MB Cartridge-Tape Backup for the Macintosh Plus & SE.
Central Point
Central Point 800K External Drive — 185.
Dove Computer Corporation
MacSnap Model 524 or 524E *(512K to 1MB Upgrade)* — 139.
MacSnap Model 524S *(512K to 1MB Upgrade w/SCSI Port)* — 239.
MacSnap Model 548 or 548E *(512K to 2MB Upgrade)* — 369.
MacSnap Model 548S *(512K to 2MB Upgrade w/SCSI Port)* — 459.
MacSnap Plus 2 *(MacPlus to 2MB Upgrade)* — 249.
MacSnap Toolkit *(Wrench, Case Cracker & Grounding Set)* — 14.
Ehman Engineering
Ehman 800K External Disk Drive — 189.
First Class Peripherals
Sider C-46 *(40MB Hard Drive with 60MB Tape for MacPlus/SE or Mac II)* — 1629.
IOMEGA *Dual Cartridge Drives*
Bernoulli Box *(Dual 10MB w/SCSI)* — 1419.
Bernoulli Box *(Dual 20MB w/SCSI)* — 1849.
MacMemory, Inc.
Turbo SE *(16Mhz 68000 Accelerator for the Mac SE)* — 399.
MaxPlus Mega *(2MB Upgrade with 1MB Chips for MacPlus)* — 349.
MaxPlus 2x4 *(2.5MB Upgrade with 1MB Chips for MacPlus or Mac II)* — 549.
MaxPlus 2x4S *(2.5MB Upgrade with 1MB Chips for MacPlus, Mac SE or Mac II)* — 629.
Mirror Technologies
Magnum 800K External Drive *(Available in Beige or Platinum)* — 209.
Network Specialties
Jump! Board 020 — 779.
Jump! Board 020 with 1MB Ram — 929.
Jump! Board 020 with 1MB Ram & 68881 — 1089.
Personal Computer Peripherals
Available in Beige or Platinum Color
MacBottom HD-21 *(20+Mb SCSI Hard Disk)* — 859.
MacBottom HD-32 *(32Mb SCSI Hard Disk)* — 999.
MacBottom HD-45 *(45Mb SCSI Hard Disk)* — 1285.
MacBottom 20 *(20+Mb Serial Hard Disk for Mac 512k & MacPlus)* — 859.
Rodime Systems
Rodime 20 Plus Hard Disk *(MacPlus SCSI)* — 759.

Blank Media

Single Sided 3½" Diskettes
BASF 3½" SS/DD Disks *(box of 5)* — 8.
Bulk *(Sony)* 3½" SS/DD Disks *(10)* — 12.
Sony 3½" SS/DD Disks *(box of 10)* — 14.
Centech 3½" SS/DD Color Disks *(box of 10)* — 16.
Fuji 3½" SS/DD Disks *(box of 10)* — 14.
Maxell 3½" SS/DD Disks *(box of 10)* — 13.
Verbatim 3½" SS/DD Disks *(box of 10)* — 13.
3M 3½" SS/DD Disks *(box of 10)* — 14.
C.Itoh Color Disks SS/DD *(box of 10)* — 22.

Double Sided 3½" Diskettes
BASF 3½" DS/DD Disks *(box of 5)* — 9.
Bulk *(Sony)* 3½" DS/DD *(10)* — 16.
Centech 3½" DS/DD Color Disks *(box of 10)* — 19.
Sony 3½" DS/DD Disks *(box of 10)* — 19.
Fuji 3½" DS/DD Disks *(box of 10)* — 20.
Maxell 3½" DS/DD Disks *(box of 10)* — 20.
Verbatim 3½" DS/DD Disks *(box of 10)* — 20.
3M 3½" DS/DD Disks *(box of 10)* — 20.
C.Itoh Color Disks DS/DD *(box of 10)* — 25.

Modems

Hayes Microcomputing
Smartmodem 1200 — 299.
Smartmodem 1200 Mac w/Smartcom II & Cable — 359.
Smartmodem 2400 — 449.
Transet 1000-128K — 269.
Transet 1000-512K — 359.
Transet 1000 Mac Accessory Kit — 29.
InterBridge *(Connect Appletalk Networks)* — 599.
Migent
Migent Pocket Modem *(ext. 300/1200 Baud)* — 169.
Prometheus
Promodem 1200 *(Hayes Compatible)* — *Special* 229.
Promodem 2400 *(Hayes Compatible)* — *Special* 299.
Mac Pack w/Procom M and Cable *(Specify Mac or MacPlus)* — 49.
U.S. Robotics
Courier 1200 *(Hayes Compatible)* — 199.
Courier 2400 *(Hayes Compatible)* — 349.
Courier 2400E *(Hayes Compatible)* — 409.
Courier HST 9600 *(Hayes Compatible)* — 689.

Digitizers

AST TurboScan *(Optically Scans & Digitizes at 300 Dots-Per-Inch)* — 1399.
Impulse Impulse *(MacNifty)* Audio Digitizer V2.0 w/SoundCap — 149.
Koala Technologies Corp.
MacVision *(Digitizer)* — 175.
New Image Technology
Magic Digitizer *(Mac 128/512k or MacPlus Version)* — 249.
MacScan *(High Speed Image Scanner at 300 [DPI])* — 1399.
Summagraphics
MacTablet 12x12 size — 379.
ThunderWare
ThunderScan V4.0 with Power Port *(Mac 512K, 512K Enhanced, MacPlus, and Macintosh SE)* — 199.

Accessories

Bech-Tech
Fanny Mac — 69.
Cambridge Automation
Numeric Turbo — *Special* 99.
Central Products
MacOpener *(All In One Mac Tool)* — 16.
Curtis Manufacturing
Diamond-Surge Suppressor-SP-1 — 29.
Emerald-Surge Suppressor-SP-2 — 36.
Ruby-Surge Suppressor-SPF-2 — 55.
Sapphire-Surge Suppressor-SPF-1 — 47.
Ergotron
MacTilt or MacTilt SE *(Platinum Color)* — 74.
Mouse Cleaner 360° — 15.
I/O Design
Mac Luggage Available in Navy or Platinum Gray
Macinware Plus Carrying Case — 69.
Macinware SE Carrying Case — 79.
Imageware II Carrying Case — 49.
Kalmar Designs
Teakwood Roll-Top Disk Cases:
Micro Cabinet *(holds 45 disks)* — 14.
Double Micro Cabinet *(holds 60 disks)* — 21
Triple Micro Cabinet *(holds 135 disks)* — 29.
Kensington
External Disk Drive Cover — 8.
Mouse Pocket — 8.
Mouseway *(Mousepad)* — 8.
ImageWriter or ImageWriter II Cover — 9.
Macintosh (Plus) Dust Cover — 9
Mouse Cleaning Kit w/ Pocket — 17.
Disk Drive Cleaning Kit — 20.
Tilt/Swivel — 22.
Universal Copy Stand — 24.
Polarizing Filter — 34.
Printer Muffler 80 — 39.
Printer Muffler 132 — 52.
Control Center — 64.
System Saver Mac *(Beige or Platinum)* — 64.
A/B Box *(MacPlus Only)* — 64.
Turbo Mouse — 85.
Moustrak
MousePad 7"x9" Size — 8.
MousePad 9"x11" Size — 9.
Nuvotech
EasyNet *(Specify Din 8 or DB-9)* — 29.
Nutmeg 15" Monitor *(Displays One Full Page)* — 1399.
Nutmeg 19" Monitor *(Displays Two Full Pages)* — 1549.
Ribbons Unlimited
Available in Black, Blue, Brown, Green, Orange, Purple, Red, Yellow, Silver & Gold
ImageWriter Ribbon-Black — 4.50
ImageWriter Ribbon-Color — 5.
ImageWriter Rainbow Pack *(6 Colors)* — 25.
ImageWriter II-Four Color Ribbon — 12.
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MacEnhancer — 175.
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DOS machines run 30 minutes per day, while the average Mac is used 2½ hours a day.

bilities are even, say around 1990, there is reason to expect that we will add the ability to automatically update files in the background, communicating to other computers where the data is stored.

Several products are missing in action—a color monitor, UNIX, and others. What's going on?

We introduced so many products this year that it's amazing we got as many out on time as we did. The good news is that the new Mac is so well received and supported by third parties. So if we are short of our own color monitors, there are still third-party products available.

UNIX is delayed only by a few months. UNIX is so important that we need a version that's representative of our style of products. No third party has ever before created a simple version of UNIX; maybe that's why there are only 250,000 copies of it running in the world today. We think the real excitement is in bringing good technologies within reach of more people.

For a long time Apple discouraged talk in the press about the Macintosh in the consumer market, yet more than half of our readers have a Mac at home. Has this policy changed?

We have made a major effort to ensure that people don't have a misconception about the Mac. If it is viewed as a toy, that hurts the availablity of powerful applications. We look at the home as a place where the Mac is used, not at the Mac as a home computer.

How have large companies taken to the Mac?

Well, we recently completed a study of how our computers are used in business. We found that on the average, DOS machines are used 30 minutes per day, while the average Mac is used 2½ hours per day. The average DOS user runs two applications while the Mac user runs six.

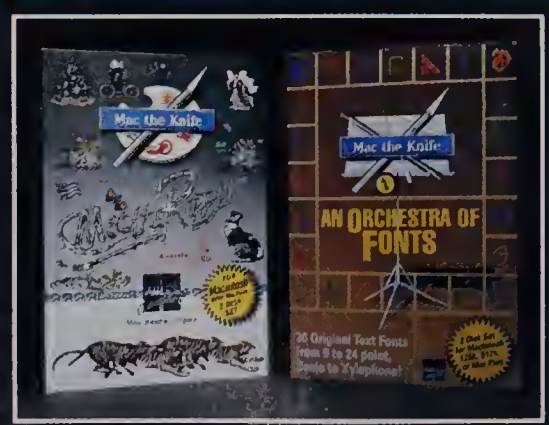
We also found that others see the importance of our consistent user interface, where all functions such as Cut and Paste, Copy, Print, and so on are the same in each application. Companies understand that training is a large part of total computer cost, and our consistency tends to reduce training time. We got into the business market with the Trojan horse of desktop publishing; once inside, we're being accepted for other things because users prefer the Mac. □

Interviewed by Jerry Borrell

A Whole New World In Macintosh Graphics.

Mac the Knife

Trici Venola, the artist for Mac the Ripper, is back with Mac the Knife 5; People, Places & Things— a completely hand-drawn collection of 25 MacPaint files. From classic to modern, Leonardo da Vinci to Bob Dylan, Stonehenge to Notre Dame, Tutankhamen's tomb to the kitchen sink. Illustrate everything from a casual flyer to a professional newsletter, using any paint program or desktop publishing package.



The Mac the Knife series (including 3; Mac the Ripper and 4; An Orchestra of Fonts) is the best there is.

Miles Computing, Inc.
Graphics Software Division
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Canoga Park, CA 91304
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MILES Computing

Circle 37 on reader service card

Circle 37 on reader service card

Denmark rethinks the computer table...

The original MacTable was the perfect place for a Macintosh. Then the Macintosh changed shape. So we thought about it again and built a new one.

Introducing the all-new MacTable. Perfect form and function for the entire Macintosh family.

Cabinet becomes platform for LaserWriter. Holds disks, manuals, and a full carton of paper.

One table fits all

The new MacTable fits every Mac made, be it 128, 512, Plus, SE, or the Macintosh II.

It has a place for everything. Hard disk, second drive, modem, keyboard, mouse, ImageWriter, and LaserWriter. Plus a carton of paper. Yet even with a full complement of gear, there's room to spread out for serious work.

Every surface interchangeable

Each of MacTable's four surfaces can be independently tilted — and interchanged! You can even make it right or left handed. So it accommodates any peripheral you'll ever have at comfortable working and viewing angles.

Stands the test of time

MacTable is meticulously built in

...again.

Interchangeable surfaces offer configurations for every size Mac.

Denmark, by craftsmen using pure beechwood and durable laminates. Its new, sturdy design and quality materials support even the heaviest equipment. And MacTable is now a new color: Platinum Gray, same as the new Macintosh line.

Matching roll-away cabinet

The new free-standing cabinet (optional) is big enough to use as a stand for your LaserWriter or CPU. It features easy-glide casters, space for full-size binders, and a special place in the locking drawer that holds over 100 disks upright and secure.

New lower price

The new MacTable also has a new price. Just $269. Add the sturdy, matching cabinet for $129 more (all prices plus shipping and handling). And if you're not satisfied with MacTable for any reason, return it for a prompt refund (less shipping).

Before you buy an ordinary table for your Macintosh, think again. Then choose the Danish solution. The new MacTable.

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Circle 400 on reader service card

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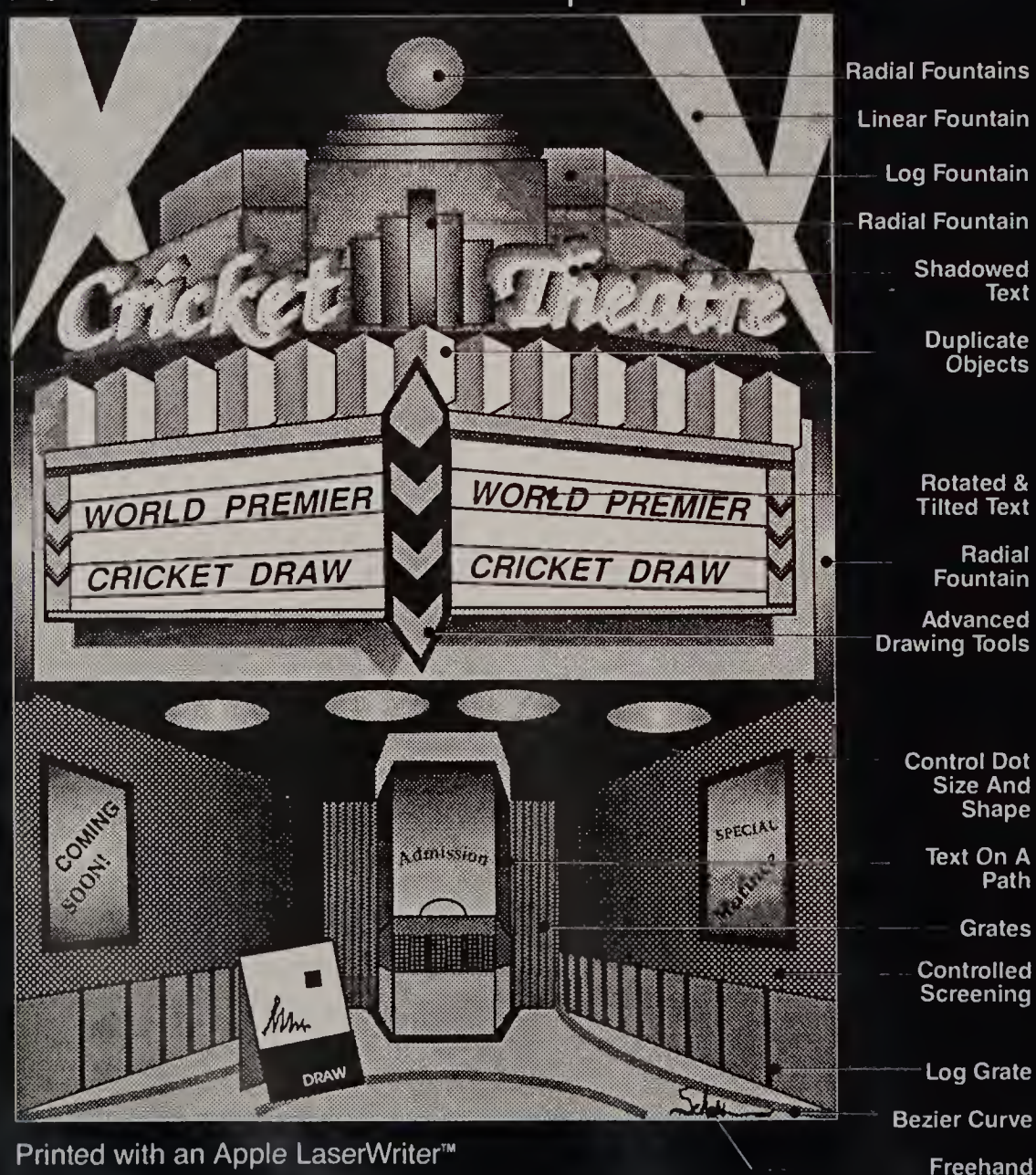

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Every place you look you'll see rave reviews. Why? Because Cricket Draw has created a **new** state-of-the-art in Macintosh drawing technology.

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Cricket Draw's most universally acclaimed capability is its special effects generation. A quick glance at the example at left will give you a feeling for what can be accomplished with a little imagination and Cricket Draw. Graded Tones (fountains), Shading, Text on any path — all these effects and more are simple with Cricket Draw.

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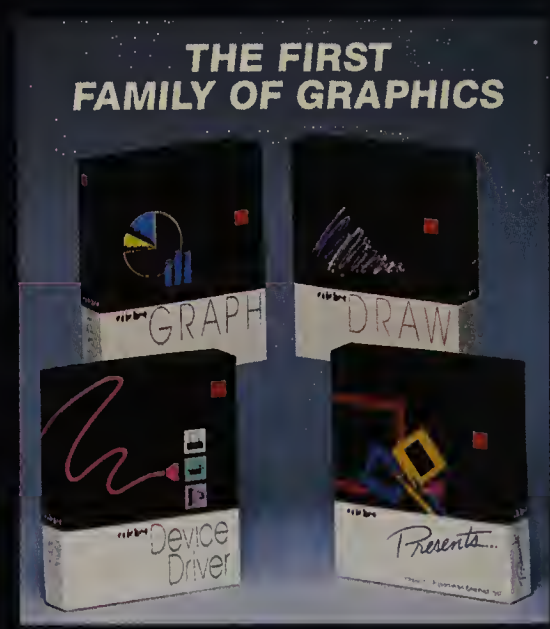

When it comes to Macintosh graphics software, there's just one name to remember — Cricket Software. Your local dealer will be happy to introduce you to the entire family: Cricket Graph, Cricket Draw, Cricket Presents. . ., and Cricket Device Drivers.

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Cricket Software, 30 Valley Stream Parkway, Great Valley Corporate Center, Malvern, PA 19355 (215) 251-9890

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Macworld News

by Gil Davis

NEIL SWAIN

Alvin Eisenman chose the Macintosh for Yale's prestigious graduate design school.

Ivy League Mac Graphics

Yale University, which boasts one of the top graphic design schools in the country, had a lot of choices when it came to selecting computers for its graduate school of art. According to Alvin Eisenman, who heads up the school's graphic design department, after four generations of graphic arts technology the design school adopted the Mac for its low cost, its high-quality performance, and its WYSIWYG capability.

The department's students design logos and typefaces using *Fontographer*. Artwork is created with *Adobe Illustrator*, layouts are designed with *Quark XPress*, and special effects are created directly in PostScript. Comprehensive sketches are printed on a LaserWriter, and camera-ready copy is sent to a Linotronic Imagesetter for high-resolution output.

Although anyone can load *Illustrator* or *XPress*, Eisenman feels that these sophisticated tools are not self-explanatory; it takes artistically inclined individuals to produce snappy looking documents using the newly available canned layout formats.

Eisenman also maintains that design offices want to hire graduates who know how to use this type of computer equipment, and that there is a great demand to teach professional designers how to use it. That's why Yale hosts a week-long summertime seminar attended by alumni who head up New York's top graphic design firms.—*Stuart Silverstone*

Managing Files the Fast Way

Now there's a way to deal quickly with all those files without having to return each time to the Finder. *DiskTools Plus*, a package of productivity tools enhanced and reborn at Electronic Arts, can perform almost all the functions of the Finder and offers some additional features as well. You select your files from a scrollable list and then click the appropriate icon according to what you want done to the files.

You can launch, delete, move, copy, find, rename, get info on, get sizes of multiple files, and even unmount your second hard disk and later remount it—all from within your application. Several DAs can perform most of those functions, but they can't rival *DiskTools'* ability to create a home base similar to the Finder. For instance, dealing with icons instead of just buttons really helps you feel as if you're in the Finder, and the implementation of a new window-management environment increases productivity.

Unlike standard files, *DiskTools* remembers exactly how many folders deep you are when you switch between volumes. It even remembers the exact scrolled position of your files list when traversing back up through the hierarchy of folders.

You can also launch your favorite documents and applications from a special customizable Quick Launch window. Or try this: select five different packed documents from one folder and press Return. *DiskTools* will launch Packit automatically and unpack all the documents.

(continues)

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In fact, we viewed the Macintosh™ II as an 'open' invitation to provide power users with the right tools. And now we're proud to introduce the NS8/16 Memory Expansion Board.

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Circle 196 on reader service card

To accomplish all this, author Evan Gross (who also wrote the popular spelling-checker DA *Thunder*) has completely rewritten the standard file interface so it works much more intuitively. As a result, we now have a powerful DA for file management that is fast, easy, and fun to use. For more information, call Electronic Arts in San Mateo, California, at 415/571-7171.–*Rob Hahn*

PC Experience Pays Off

Tecmar offers something different with its new *QT-Mac40* 40MB tape backup: the expertise gained from becoming a leader in tape backup systems in the MS-DOS world. One result of this experience is Tecmar's reliance on the QIC-100 recording standard, which features high-level error correction.

According to Gene Della Torre, director of Tecmar's new Apple Products Division, the external *QT-Mac40* gives Macintosh users all the benefits of Apple's cartridge tape unit in a portable system at an affordable price. The $1395 device connects to the Mac Plus, SE, or II through a SCSI interface and features both mirror-image and file-by-file backup. Also available from Tecmar is the Lab Master II, a $1250 board for the Mac II that performs analog-to-digital signal conversions.

Tecmar has a series of other products under development, including an expansion chassis for the SE and the Mac II. This external box will provide extra slots and thus the ability to install additional floppy drives, hard disks, and tape backup systems. The company also plans to supply graphics and multifunction boards for the new machines, as well as boards dedicated to scientific data acquisition and industrial control and monitoring. Tecmar expects the Mac II to be used in growing numbers in the latter two areas.

For more information contact Tecmar, 6225 Cochran Rd., Solon, OH 44139, 216/349-0600.–*Karen Sorensen*

FRED STIMSON

Tecmar's QT-Mac40 tape backup is part of the trend to bring DOS peripherals to the Mac.

Desktop Construction

Equipped with his desktop CAD system, Tom Smith designs and builds ultra-energy-efficient houses. While the Mac helps Smith to draw faster and be more organized, it benefits him most by improving his design capabilities.

With the Mac, Smith and his clients can examine, change, and refine plans until they get the house looking and functioning exactly the way they want it. Smith's clients stay involved with the Mac-generated plans longer than before, when he showed them paper blueprints.

When the design is completed, Smith uses *ReadySetGo* to put together a specification book. The document includes everything from blueprints to brick patterns, so that the customer can show off the soon-to-be-built home. In addition, Smith uses the Mac to display his portfolio of designs to potential clients.

JOYCE RAVID

Tom Smith and his son visit an energy-efficient house Smith designed on a Mac Plus. Preliminary renderings were shown on the Mac so the client could participate in revisions.

How did this architect begin his Macintosh adventure? Smith originally bought the Mac to write a book describing his architectural philosophy. From preliminary drawings and blueprints prepared as illustrations, Smith progressed to using the Mac for working blueprints, order forms, job controls, and client letters. With the help of Dick Bishop, CAD specialist at Custom Computer Specialists of Hauppauge, New York, Smith put together his CAD system.

Smith's hardware now includes a Mac Plus, a HyperDrive FX/20, a Radius Full Page Display, a LaserWriter Plus, and a Hewlett-Packard DraftPro Plotter; he uses *MacDraft, ReadySetGo 3.0, FileMaker Plus,* and *Excel* for software.

You can see the results of Smith's Mac-oriented architecture in his book *Tom Smith's Common Sense Architecture,* which will be released next spring by Random House. –*Brita Meng*

MIDI Standard Proposed

A MIDI file format was formally proposed to the MIDI Manufacturers' Association (MMA) at the June trade show sponsored by the National Association of Music Merchants (NAMM).

Offering the standard was Dave Oppenheim of Opcode Systems, who has been developing the new file-transfer format for the past year in association with other MIDI developers.

(continues)

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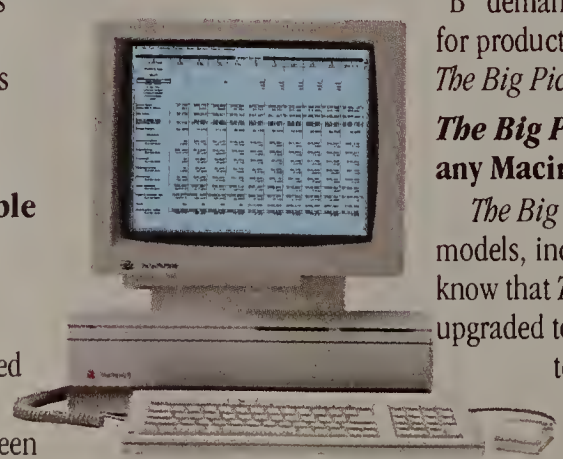
If you are a designer, engineer or a professional in business, marketing or sales you have probably discovered you can work faster and communicate better with a Macintosh.™

Add *The Big Picture*™ from E-Machines and you open new vistas of power. Here is the opportunity to see your best work unfold. *The Big Picture* displays a 1024 by 808 pixel desktop that shows you over four and a half times more information than the standard Macintosh screen, or almost three times as much as either of the optional screens for the new Macintosh II.



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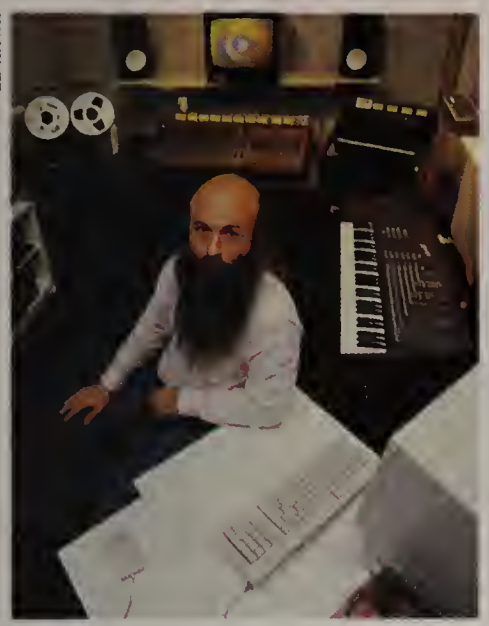
ED KASHI



David Kusek's new MIDI standard may aid the growth of the electronic music industry.

Right now, the MIDI (Musical Instrument Digital Interface) protocol enables computer-controlled synthesizers, sound processors, and computers to converse and cooperate. Each sequencer or editor application creates proprietary files.

File transfers involve running a sequence in real time, sending MIDI performance data as if played by a human, and then resaving. This time-consuming procedure could be replaced by the new MIDI file format, which would make such exchanges as simple as opening files within a dialog box.

Passport president David Kusek says, "The analogy isn't perfect, but MIDI files represent a *Glue* for musicians. The MIDI file format will give software vendors the kind of kick the original MIDI [hardware] spec gave synth manufacturers."

A MIDI file based on the new standard will be device-independent. Songs can be transferred from a Mac to an Apple II or from a IIGS to a Commodore 64 and back by modem, over MIDI cables, or on magnetic media. Further, this format is expected to encourage modular software, which will mean that any editing program can swap files with any sequencer or printing module, regardless of the manufacturer. For example, Commodore users might laser-print scores or edit tunes on a friend's Mac.

Proponents of the standard envision three file types: single-track multichannel, like a cassette of a song; *n*-track parallel, where data is separated; and sequential multichannel. This last format divides a sequence into verses and choruses, the way MIDI hardware often handles a song.

Mac-MIDI software vendors seem to love the proposed format. Already, Intelligent Music's *Jam Factory* and *M* read and write the new MIDI files. Southworth Music Systems' *MIDIPaint* and *One-Step* will read them but won't write them "until the proposal is locked down by the MMA," according to SWS chief executive officer Bill Southworth. The Japanese MIDI Standards Committee must also approve it. There's a glimmer of Macintosh piracy in one coder's comment: "We just got tired of sitting around and waiting."

Apple's participation has been minimal. In Cupertino, Steve Milne of the Music Engineering Group reports that the MIDI file standard is a welcome step, and that informal meetings have been held to discuss a device-independent digital-sound-sample file standard.

It seems that *connectivity* must be more than a marketing rubric in the Macintosh-MIDI world.—*Craig O'Donnell*

Magazine Quality

We're used to thinking of the Mac as a valuable tool for producing newsletters and pamphlets. But more and more we're seeing powerful new programs that thrust the Macintosh, and especially the Mac II, into some of the most demanding graphic applications.

This scanned photograph of Greta Garbo shows the kind of image-processing capabilities that are now available on the Macintosh.

A case in point is a new program called *The Lithographer* from Knowledge Engineering that can produce magazine-quality halftone prints using a typesetter. *The Lithographer* raises the Mac's graphic output from newspaper quality to magazine quality by taking full advantage of the Macintosh II's ability to display gray levels on the screen. Combine that important function with automatic and mouse-controlled editing tools and you have a kind of electronic stat camera, according to Bill Bates, president of Knowledge Engineering.

This computerized stat camera takes highly detailed scanned images and generates dense bit-mapped images for a typesetter. *The Lithographer*'s output is not PostScript but a pixel-by-pixel representation of the picture. While a bit-mapped image may require much more memory than a PostScript representation, it means that color separations can be rotated without creating the moiré patterns typical of PostScript, claims Bates. (Adobe says moiré patterns can be prevented through standard techniques.)

It's also possible to create mezzotints, using textured screens, etchings, and posterizations.

The Lithographer is now available for the Mac II in its black-and-white version. Can a color edition be far off? Call Knowledge Engineering in New York at 212/473-0095 for information on the availability of a color edition.

Out of the Closet

Now your Macintosh SE HD20 can safely stay on your desk at night instead of being relegated to a locked closet for protection of its internal data.

Home users of an SE might not be so concerned about theft or alteration of data, but publishers, government agencies, and big banks are especially interested in data security, explains Harry Sweere,

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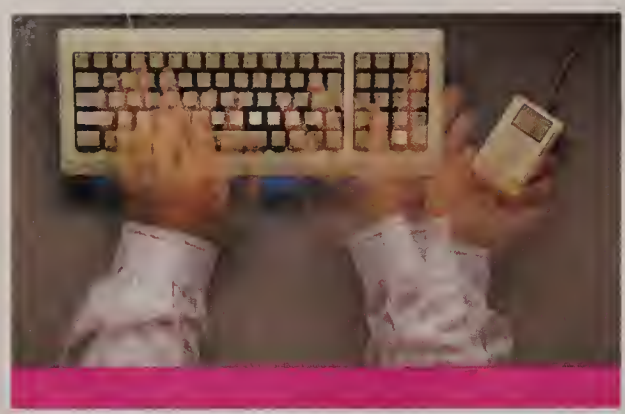

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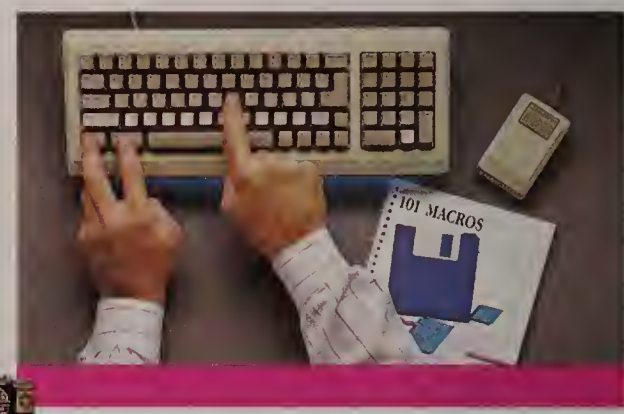

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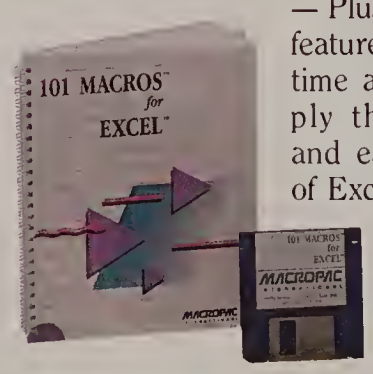

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Circle 653 on reader service card

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president of Ergotron. "When people had Pluses with external hard disks, they could easily unplug the drive and lock it in a desk or closet. With the SE they'd have to unplug a number of cables and take the whole computer into a closet."

In response to requests from SE owners for a more convenient form of security, Sweere invented the MacTilt SE Security System, which he aptly calls the Muzzle.

To use the Muzzle, simply insert its steel tang into the SE's internal disk drive opening at the front and slip the remainder of the harness under the computer or MacTilt mechanism. Then fold the hinged backplate upward, covering the power plug, and lock it using a loop inserted in the security opening at the back of the Mac.

When you're done, the hard disk is protected from use by the absence of power, and data can't be extracted from the blocked disk drive. In addition, the MacTilt mechanism is now

Ergotron's Muzzle secures an SE's internal hard disk.

locked to the SE—an added benefit if the MacTilt is locked to the desk, says Sweere.

The MacTilt SE Security System costs $49.95 alone or $129.95 with the MacTilt SE. For further information, call Ergotron in Bloomington, Minnesota, at 800/328-9839.

Filling the Interface Gaps

Ever say to yourself, "There must be an easier way?" Well, so did Loftus Becker, Jr., who by now has probably written more small utilities for the Mac than anyone else. Now thousands of Macintosh users are enjoying Becker's shortcuts.

One of Becker's first contributions was showing us how to reconfigure our keyboards using *Fedit*—a technique he popularized on various telecommunication services.

This System hack was the precursor to Becker's popular and free DA *ToggleKeys* 1.03, which allows the typing of commas and periods while in shift mode by eliminating the < and > symbols. Want those symbols back? Just select *ToggleKeys* once again.

Becker went on to release two commercial programs: *ToggleKeys FKey* 1.31, and *Keyboard* 1.0, which can reconfigure the entire keyboard. Both products are being revised for the new System and will be shareware offerings in their new incarnation.

Next, Becker wanted to use both fonts and DAs while working in any application. So he wrote two shareware contributions called *Other...* (version 3.09, $10) and *Fontsie* (version 3.06, $10), which can run DAs and fonts stored on a disk.

In a similar manner, Becker's *DA Key* 2.15 ($10) allows DAs to be run from a file by invoking an F-key. Another DA, *Launch DA/FKey* 1.4, a free F-key, takes the matter further. It instantly creates a window for typing the name of any installed DA or F-key, which is launched as soon as a unique match is found —often after you've typed only a few letters of the name.

By now you might be wondering how to use all these F-keys, given the Mac's standard limitation of eight new F-keys. Becker's *FKey Runner* 1.01, a commercial desk accessory, comes to the rescue by allowing numerous F-keys to be run from a menu.

One of Becker's more complex programs is *Time Logger* 2.11 ($15), a shareware DA that tracks how the Mac is used. It works automatically or manually and has many optional features, including the capacity to save records to any number of files.

Change Appl Font (1.03), a desk accessory, sets the default fonts and font sizes of documents.

Other valuable and free contributions from Becker prepare messages for upload to online services. *ClipperKey* 1.5 and 1.6, F-keys that format text files by inserting or stripping carriage returns, also monitor line length and number of characters and operate invisibly through keyboard commands.

When not adding to the Mac's capabilities, Becker teaches law at the University of Connecticut, where he specializes in criminal law, constitutional law, law and psychiatry, and computer law.

Becker's free software and shareware offerings can be found on many user-group bulletin boards. His commercial programs can be obtained by calling Dreams of the Phoenix at 904/396-6952.—*Linda Joan Kaplan*

KEN COLLINS

Loftus "Lofty" Becker, Jr., writes many small utilities for the Mac when he's not teaching law at the University of Connecticut.

JClock's Author Wins Timely Award

"It's so universal, everyone uses it. Not only that, but it never bombs," said Rebecca Waring, codirector of the Boston Computer Society (BCS) Mac user group.

With those words, Waring explained why Jim Sulzen, author of *JClock*, a small Init resource that puts a little digital clock in the Mac's menu bar, received a $500 grand prize award from the 3000-odd members of BCS Mac, following the July ballot. Sulzen, who was director of the

(continues)

Ten thousand pages, take it or leave it.

For those of you going places, here's a little something that solves big storage problems in the time it takes to say "who has the Farnsworth financial files?"

Introducing Totem.™

A rather revolutionary Bering 20 mb Bernoulli compact disk drive system for Macintosh computers. And, the first truly *portable* 5¼" system. One that lets you tote around 10,000 pages of data on a sleek cartridge about the size of a piece of bread.

Translated, that's 25 times the storage you get on one standard floppy.

Yet unlike floppies, the Totem is no slouch for speed. It's just as fast as a hard disk. In fact, your computer will think it's a hard disk. You can even share it with co-workers. And its advanced Bernoulli aerodynamics make it resist head crashing. If you've ever used hard disks, you know what a pain that can be.

But the real beauty of Totem is that it fits perfectly right under your Mac. No mess. No fuss. And no extra hardware to buy. To add storage, just pick up another Totem cartridge.

Last, but certainly not least, there's a whole family of Totem drives to choose from. They're all in the brochure. To get yours, write or call Bering Industries, Inc., 280 Technology Circle, Scotts Valley, CA 95066. Inside California, call 800 533-DISK. Call 800 BERING 1 outside California. Just say "I'll take it."

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Circle 627 on reader service card

BCS Mac technical group before moving to California two years ago, took the award at the August Macworld Expo in Boston.

BCS members also voted for four runners-up, who received $250 awards: Gil Beecher (author of *Disktop DA*); Steve Brecher (author of *PowerStation, DA Mob, WayStation,* and *Regress*); Harry Chesley (author of *VCO* and *PackIt*); and Itty Bitty Software (actually a company, creator of *AutoBlack*).

They join an elite group of previous winners that includes Bill Atkinson (creator of the Toolbox, *MacPaint,* and *HyperCard*), Scott Watson (Mr. *Red Ryder*), Charles Maurer (designer of the Boston II font for the ImageWriter), and John Raymonds (author of *The Dungeon of Doom*).

The BCS awards honor contributions to public domain and shareware programs for the Mac. The awards recognize

those who have written significant programs and those who serve the computer community–for example, by assisting users over telecommunication services like CompuServe and *AppleLink*.

Contest rules currently state that previous winners cannot be renominated, but BCS is starting to run out of nominees. Consequently, the BCS Mac group may open up nominations to previous winners, based on new services to the public domain/shareware community. Another option, according to Rebecca Waring, is to award only two prizes and increase the award money.
–Brita Meng

FRED STIMSON

Color printing is now available for the Macintosh in a variety of formats and technologies, starting at $1395 for an ink-jet printer.

Color Printers Now

People inevitably say, "That color looks great on your Mac II screen, but what can you do with it?" While the ultimate solution, a color laser printer, may be a year away, alternatives are available now.

For instance, there's Hewlett-Packard's PaintJet, a $1395 ink-jet printer offering a resolution of 180 dots per inch (dpi), which is superior to the ImageWriter's 144 dpi but not equal to the LaserWriter's 300 dpi. The PaintJet is much quieter than most dot matrix printers and prints at a respectable 167 characters per second.

HP has been careful to make this new printer available to Macintosh users; a driver is required to make it Mac compatible. Some Macintosh programs, such as *Cricket Draw* and *Cricket Graph,* already include PaintJet drivers, but a generic driver will soon be available from Softstyle Solutions of Honolulu. Connection is through an RS-232C serial port.

Another alternative is Shinko's $4500 thermal printer, which outputs on special paper. Although its 200-dpi resolution can't match the LaserWriter, Shinko's printer has found wide acceptance as a color-proofing machine for desktop publishing, and for making overhead transparencies.

The Shinko printer is distributed by Computer Friends, a company closely related to Reed College's computer development lab in Portland, Oregon. The Reed lab is building links between the Shinko and the Macintosh by releasing a parallel port card for the Mac II ($299) and a software package that includes a printer driver and poster-design capabilities ($399).

Another candidate is Apple's new ImageWriter LQ, which comes with a 27-pin print head that delivers up to 216-dpi resolution with a speed of 250 characters per second in draft mode. A four-color ribbon gives the LQ its color printing capabilities. At press time, the LQ was expected to cost between $1300 and $1500.

Full-color laser printers are being designed by Japanese firms such as Canon, Ricoh, Toshiba, and Sharp. But an American company, Colorocs Corporation, may be the first to market a full-color printer in the United States. Colorocs has reportedly demonstrated a four-color printer with 300-dpi resolution and a speed of 10 pages per minute (ppm)–42 ppm in black-and-white mode. It's expected to cost at least $10,000.

For further information, call Hewlett-Packard in Palo Alto, California, at 415/857-1501; Computer Friends in Portland, Oregon, at 503/626-2291; Colorocs Corporation of Norcross, Georgia, at 404/448-9799; and Apple Computer in Cupertino, California, at 408/996-1010.
–Scott Beamer

Plain-Paper Typesetters

Apple's LaserWriter set new standards for written communication and spawned a new industry: desktop publishing. But it took Linotype's Linotronic electronic typesetters equipped with the PostScript page-description language to give Macintosh users access to typographic-quality printing.

Over the past couple of years, more than a dozen competitors have emerged for Apple's LaserWriter printer. Now the high-end laser printers, such as the Linotronic printers, are being challenged.

For instance, the Varityper VT600 plain-paper typesetter

The Varityper VT600 boasts 600-dpi resolution.

includes the PostScript RIP (raster imaging processor) and a built-in 20MB hard disk in its list price of $18,750.

Varityper claims the VT600's processing speed is two to four times faster than the LaserWriter's, and its 600-dpi resolution is twice the LaserWriter's.

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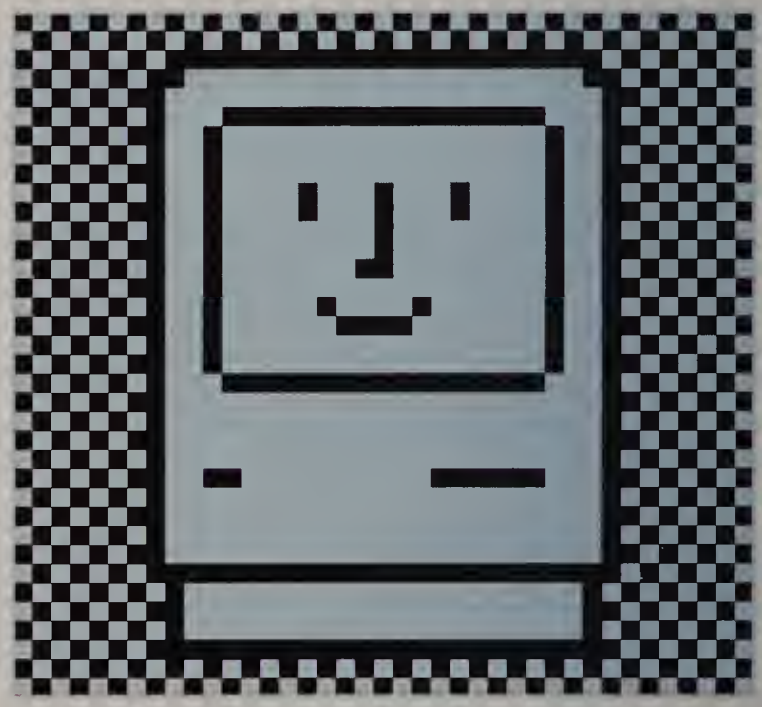

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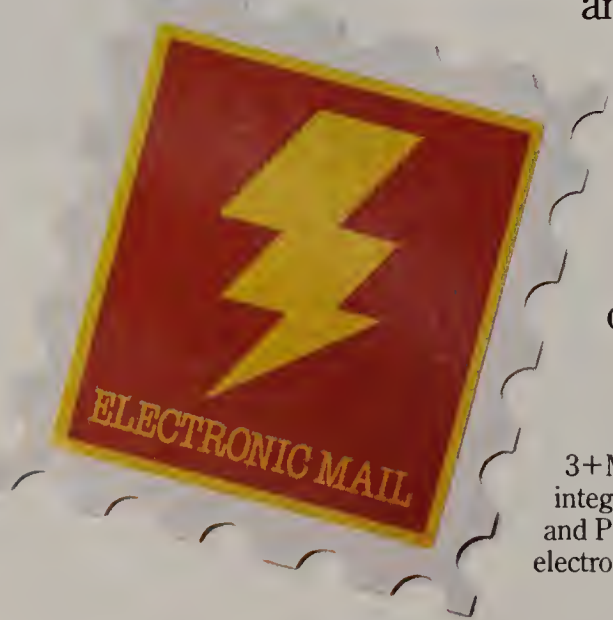

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Circle 704 on reader service card

In terms of resolution, the Varityper is midway between the LaserWriter (300 dpi) and the Linotronic 100 (1200 dpi). For many typesetting uses, this will be adequate to produce camera-ready copy.

The increased speeds come from advanced electronics, and the higher resolution is possible because of an ultrafine toner. The Varityper can be connected into a Macintosh system through AppleTalk or an RS-232C port.

Another challenger: Printware's laser printer, which is packaged as two discrete units, the 720 IQ Laser Imager and the 1200 HD Image Processor. Both are required for operation. Printware will probably already have introduced its own PostScript processor, PrintScript, by the time this is published. PrintScript will be available as a board for Printware's Image Processor, adding $2000 to the price of the unit.

Including a 20MB built-in hard disk, the total price of the Printware package will be about $17,000. The printer has 1200- by 600-dpi resolution now, with expansion to a full

The 720 IQ Laser Imager takes resolution to new heights.

1200 by 1200 slated for early 1988. A SCSI port is just now being added, making connection to a Mac easier.

Tegra, a manufacturer of electronic typesetting machines, is expected to announce a Macintosh interface soon. The Tegra machines will output up to 20 pages per minute and be priced beginning at $37,000. Two models will be available: a 1000-lines-per-inch plain-paper unit and a 2000-lines-per-inch film unit. The output can be transferred directly to the printer's plate.

Because of the relatively high price of these plain-paper typesetting machines, those not doing daily typesetting will probably use them through service bureaus.

For the desktop publisher, these machines have bridged the either/or choice between LaserWriter quality and typeset quality. You can choose the printer for your project on the basis of speed, cost, and quality. For more information call Tegra in Billerica, Massachusetts, 617/663-1449; Varityper in East Hanover, New Jersey, 800/423-1829; and Printware in Mendota Heights, Minnesota, 612/454-9522.

–Scott Beamer

HyperCard Latches VideoWorks

HyperCard is now grabbing programming hooks strategically placed inside the latest version of *VideoWorks*. The result: a seamless transition that makes the two programs act as one. It may start an important new trend.

Picture the two programs working together. You sit down to a 19-inch color monitor mounted atop a Mac II. You begin a training program about the human circulatory system. You open up a *HyperCard*-based program that includes imaginative graphics to make the presentation fun.

Using *HyperCard,* you select a tour of the human heart. As soon as you release the mouse, you're on a sleigh ride through a major vein. You come shooting toward a closed heart valve. It opens just in time, and your colorful tour of the human

HyperCard *can now control* VideoWorks II*'s colorful animations, giving users the ability to direct their own Mac-based movies.*

heart has begun–if your own heart hasn't quit in fright.

This kind of training and educational software is possible because MacroMind has designed its *VideoWorks* program to work hand in glove with *HyperCard,* the revolutionary program by Bill Atkinson of Macintosh Toolbox and *MacPaint* fame. *HyperCard* is now packaged with every new Macintosh and is available at Apple dealers.

"*HyperCard* is the fulfillment of a five-year-long dream about the capabilities of the Macintosh system," said MacroMind president Marc Canter. "In this case, it's what makes our *VideoWorks* interactive."

Citing another example of interactive software, Canter described a disk-based software manual. As the user seeks help, various selections prompt *VideoWorks* to simulate how the actual program works: the cursor moves, fonts change, and files open and close.

Canter expects that thousands of educational and training programs will be written using *HyperCard,* because it provides a scripting language that's relatively easy to implement–something that's been long awaited by software developers.

VideoWorks has its own authoring language, which Canter hopes will also become a standard. To help that process along, he's giving away the "projector" that makes *VideoWorks* run during an application. (You'll still have to buy the program to create the movie.)

"I know a few developers don't like *HyperCard* because it can replace some of their programs, especially the DAs. But for every ten developers that go out of business, hundreds will take their place using *HyperCard,*" said Canter.

For more information about *VideoWorks,* you can contact MacroMind in Chicago at 312/871-0987.

Neural Nets Think Mac

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Circle 373 on reader service card

SETH RESNICK

Matt Jenson believes* MacBrain *is a shortcut to artificial intelligence work on the Mac.

That's just one of the possibilities with a relatively new concept called *neurocomputing,* a branch of artificial intelligence that creates computational systems based on the design of the human brain. These systems, called neural networks, can now be created on the Macintosh using a new program called *MacBrain,* from Neuronics of Cambridge, Massachusetts.

Matt Jenson, president of Neuronics, points out that the brain learns and remembers by stimulating units that represent patterns of information, like a face or a symphony. "The exciting thing," Jenson says, "is that spreadsheet cells and database fields can also create patterns in the 'mind' of their neural networks. Using outcomes of transactions as additional units in the patterns, an expert system can emerge from a database."

Even more is expected from neural-net technology, according to Bart Kosko, a leading mathematical theorist in neurocomputing. He predicts that we'll see desktop neurocomputing within two years, and that within five years neural nets will transcribe office dictations and compose graphic layouts for desktop publishing. *–Beverley Kane, M.D.*

Word Finder Arrives

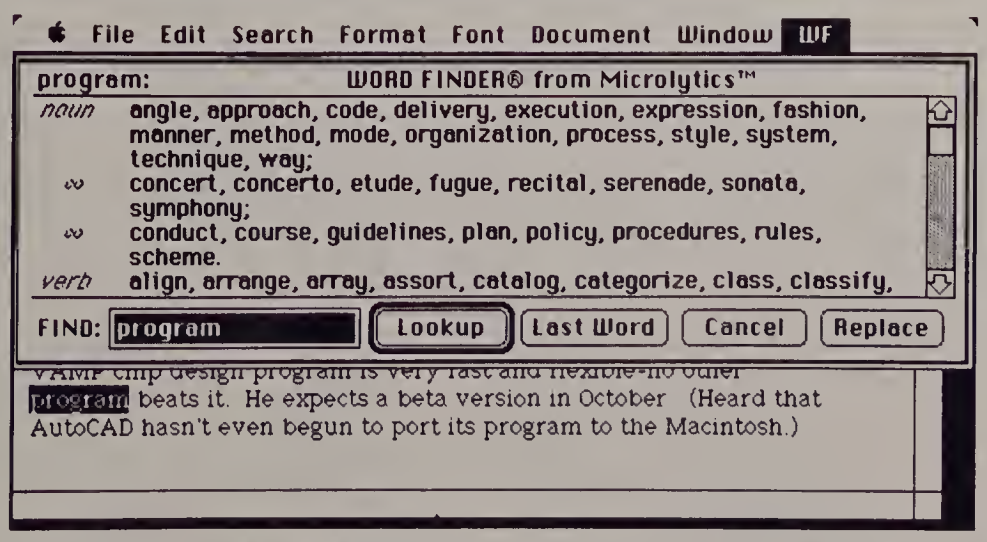
Microlytics' *Word Finder,* one of the most highly regarded thesaurus programs for the IBM PC, is now available for the Macintosh.

What makes this DA special, according to Microlytics president Mike Weiner, is not only its speed and the large number of synonyms it offers, but the fact that it functions in a rich and entertaining manner. For example, *Word Finder* lists 80 synonyms for the word *sexy.* The program also lets you look up synonyms for any word in the synonym window, ad infinitum.

Once you select *Word Finder* from the Apple menu, it appears on the menu bar of the program you're using. To find a synonym for a given word, you highlight that word in the text, pull down the *Word Finder* menu, and choose Lookup. A scrollable window of synonyms instantly appears. The synonyms are separated into noun, adjective, verb, and so on, and groupings of similar meanings are marked with bullets.

Word Finder offers an average of eight synonyms per meaning group. Choose a synonym, double-click on it, and the chosen synonym instantly replaces the highlighted word. If you want to explore further, click once on a synonym and the program will provide you with a new set of words: synonyms for the synonym.

Word Finder works with most popular Mac programs, including *MacWrite, WriteNow, Microsoft Word, More,* and *ReadySetGo.* For more information, call Microlytics in East Rochester, New York, at 716/248-9150.*–Felicity O'Meara*



Select a word and launch the DA* Word Finder, *and you'll be presented with an organized list of potential synonyms. Click on Replace and the DA does it. No telling what words you might find.

Take It with You

Now there's a Macintosh that can go where you go. Colby Systems' WalkMac weighs a scant 15 pounds (compared with 20½ pounds for a Mac Plus) and it can be used with either a battery pack or a 110-volt outlet. WalkMac's designer is Chuck Colby, who is an old hand at putting the Macintosh in portable enclosures, having begun with the first Macintosh in April 1984.

WalkMac's exterior consists of a heavy-duty plastic case 16 inches wide, 11 inches deep, and 5 inches thick. It fits under a standard airline seat–even when packed in its optional case that also contains a portable printer. (A Plus or an SE can be disallowed as carry-on luggage because its minimum dimension is 1.7 inches larger than the 8-inch maximum thickness set by airlines.)

An important part of the package is a flip-up gas plasma screen that's 30 percent larger than the Mac Plus or SE display but contains the same number of pixels.

Inside the unusual box are standard Macintosh components, such as a Plus or SE logic board, a Plus keyboard, an 800K disk drive, an AC/DC power supply, and an optional 20- or 100MB hard disk.

WalkMac includes a two-button mouse. "The mouse, which will also be marketed separately, never needs cleaning and will work perfectly when rubbed against nearly any surface–even when upside down," Colby says.

Open the tidy WalkMac package and you'll find all major components enclosed in plug-together modules. Each part can be interchanged or upgraded at will, and the tiny hard disk can be snapped out and slipped into a briefcase or pocket.

FRED STIMSON

WalkMac: ***an 8- to 15-pound portable with a sharp picture.***

Basic suggested list price is $4995 for a Mac Plus and an extra $1500 for a 40MB hard disk. Also available is a three-hour battery pack and a turbo accelerator card. Future options include a much lighter keyboard and an LCD display that should bring the total weight to 8 or 9 pounds. For more information call Colby Systems in Palo Alto, California, at 415/941-9090. □

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Just How Compatible Is Compatible?

The mysteries of Mac II compatibility: what works, what doesn't, and why

by Bruce F. Webster

The Mac II represents a major development in the Macintosh product line. It has open slots, multiple video options, a new processor (68020) and math coprocessor (68881), room for lots of memory, and significantly modified ROM and operating system routines. Given all that, it's not surprising that the question of software (and, for that matter, hardware) compatibility arises.

On the other hand, the answer is surprisingly evasive. It's clear when a program isn't compatible: it acts funny, crashes, refuses to print, or in a myriad of other ways fails to perform as it would on a "regular" Macintosh. But if you launch a program and no

PHOTOGRAPH BY DAVID BISHOP

problems immediately arise, is it really compatible? Or have you just not encountered the bugs yet?

To explore some of the reasons for incompatibility, I've run a number of programs on a Mac II and recorded my results. However, three warnings are in order.

First, since bugs can be difficult to uncover, just because I failed to turn them up doesn't mean they aren't there; it may just mean that I failed to do the right (or wrong) things to invoke them.

Second, the Macintosh software market is too vast to cover effectively. I requested several key software packages, and got only scattered responses. But even so, I ended up with a long list of products to look at, without much time to devote to each. And since I was unfamiliar with many of the products, I did not always know how best to wring them out.

Third, I don't have the latest version of everything. I have old releases of some popular applications and no way to quickly get the latest. In many cases, I chose not to test the software at all rather than use an outdated version.

And there's also the issue of lead time. This article is being written in late July but won't appear for a few months. Many developers are out there furiously modifying their programs to work on the Mac II; revised versions may well be available by the time you read this. Because of that, version numbers (when available) are given for the products tested.

The Test System

The Mac II I used to test all this software included an 800K disk drive, a 40-megabyte hard disk, 1MB of RAM, the Apple video card (640 by 480, 4 bits/pixel) with an Apple monochrome monitor, and the SuperMac Spectrum board (1024 by 865, 8 bits/pixel) with a 19-inch Sony monitor. Current system software was used: version 4.1 of the System and version 5.5 of the Finder. The Sony was used as the main screen (with menu bar), with the Apple display to the left.

Using two screens, one much larger than normal, was crucial to the test. Some of the products that had problems would have run fine with a single regular-size display, but that doesn't really make them Mac II compatible, does it?

Reasons for Incompatibility

OK, OK, you've seen this list at least half a dozen times in the past few months, but once again we're going to go over the reasons why a fair number of Macintosh programs have trouble running on the Mac II.

One major reason is that developers (including some at Apple) violated the guidelines set down by Apple a few years ago. Briefly, these guidelines said: assume nothing beyond what we tell you, and take nothing for granted. In other words, don't count on the video RAM's being at a certain memory location, or the display's having certain dimensions. Don't presume to use reserved memory locations just because they aren't currently used by the System. Don't think that the processor is always going to be just a 68000. And so on.

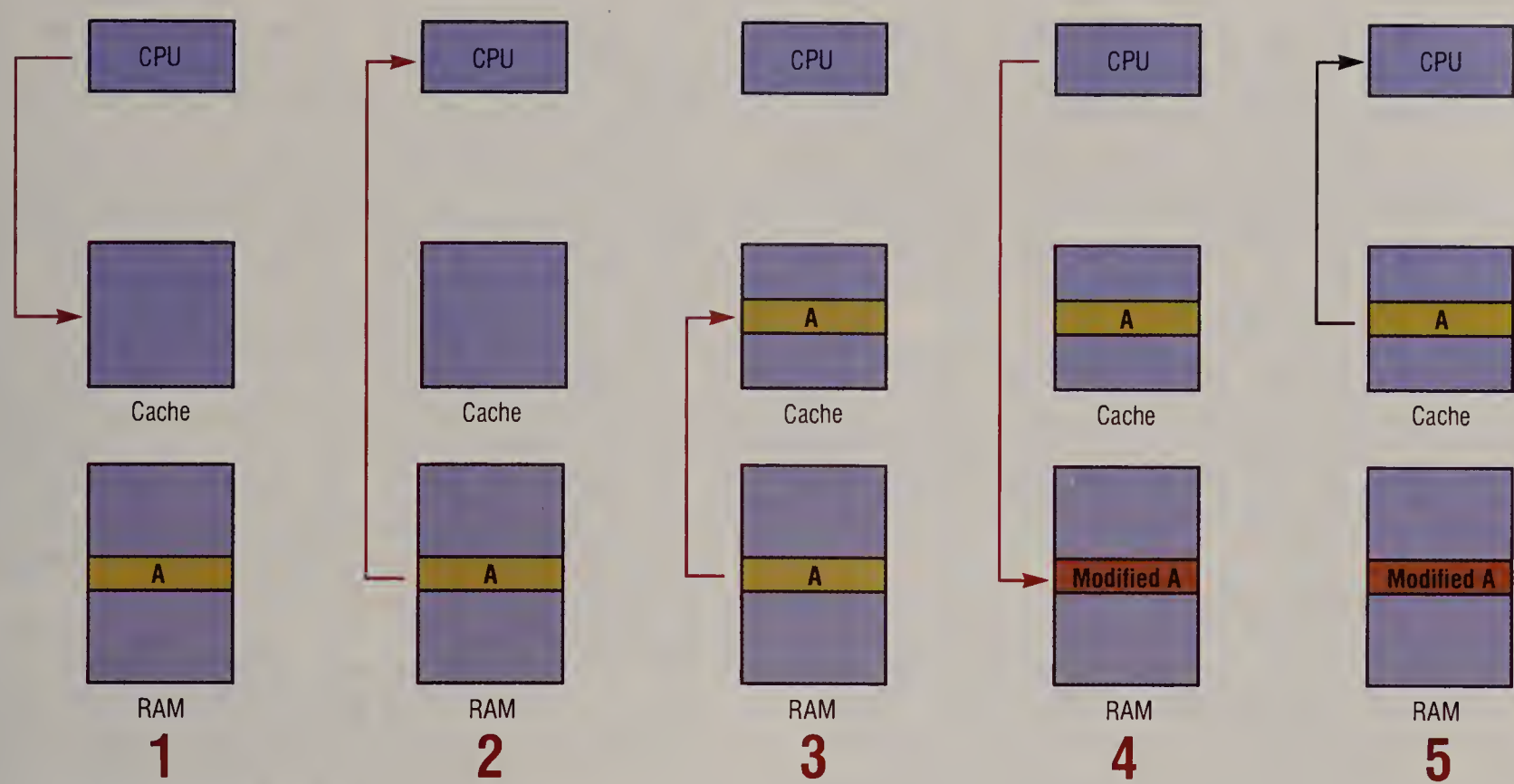
Another major reason is that the Macintosh designers didn't anticipate the migration to an open architecture, and so they made a lot of assumptions and built those assumptions into the ROM and operating system (OS) routines. The ROM has gone from 64K to 256K, and the OS has suffered similar changes. Furthermore, the introduction of MultiFinder (previously code-named Juggler) represents an attempt to introduce multitasking in an operating system that has always assumed single tasks. Needless to say, developers have not always been pleased by—or been able to keep up with—the resulting shifts and lurches in system software.

Macintosh designers made a lot of assumptions and built those assumptions into the ROM and operating system routines.

Compounding all that has been Apple's reluctance to get final versions of hardware and software to developers for final testing. With last-minute hardware changes, and system software updates occurring well after product release, developers can find themselves stung. One firm I talked to told of Apple's refusal to swap its prototype system for a final version, citing the heavy demand and claiming that the two were identical. As it turned out, they weren't. After releasing a product that ran fine on the prototype but poorly on the final versions, the company ended up having to provide updates for large numbers of customers.

Back to the developers' sins. The 68020 has an instruction cache, in which it keeps the last 64 instructions it has executed along with each instruction's address. When it fetches an instruction from a given address, the 68020 first checks to see if that address is in the cache. If it is, the 68020 loads the instruction from the cache instead of fetching it from memory.

Unfortunately, some programmers use a technique called *self-modifying code,* which allows the program to rewrite its own instructions and then execute them again. This technique is especially popular for copy protection code, to keep would-be crackers



Heading for a Crash

Programs that modify themselves in memory will not work on 68020-based Macs. (1) The 68020 CPU searches its cache for the next instructions. (2) If not found, the CPU fetches the instruction from RAM. (3) A copy of the instructions is placed in the cache. (4) The program modifies the instruction in RAM. (5) The CPU fetches the unmodified copy from the cache, resulting in a program error.

from tracing the instructions as they execute. However, if the 68020 goes to execute a modified instruction, and the unmodified version is still in the cache, then guess which one the 68020 uses? Right: the unmodified one (see "Heading for a Crash").

There are more pitfalls, but these should be enough to give you an idea of the problems inherent with Mac II compatibility. Frankly, I'm amazed that so much software runs as well as it does. Let's look at some of the packages I've tested and see how they did.

Word Processing

Microsoft Word 3.0. *Word* runs just fine on the Mac II, or better put, the bugs that show up aren't any news. I've heard some reports of *Word* having problems with large-screen displays, but I haven't encountered any. (I used *Word* to write this article.) As this issue went to press, Microsoft had just released version 3.01, which reportedly has corrected the bugs in version 3.0.

MacWrite 4.6. Apple violated its own guidelines with the software it produced; it's ironic that neither *MacWrite* nor *MacPaint* would work on the Mac II when it was first released. However, the just-released *MacWrite* version 4.6 does work, with only one annoyance: it always asks if you want to save your changes, even if none were made.

ReadySetGo 3.0. No problems encountered. The large screen helps a lot in laying out pages.

Expressionist 1.0. It launches and runs fine. However, it didn't want to let me save the scratchpad equation I had created, and it finally crashed during my attempts to do so.

Doug Clapp's Word Tools 1.01. One problem, and I don't know if it is specific to the Mac II, or if it's just a run-of-the-mill bug. I modified the suspect punctuation list; after that, the program couldn't find any punctuation problems and finally encountered a system error.

Painting and Drawing

Cricket Draw 1.01. It seems to work fine; the few occasional glitches are more likely caused by the software itself rather than by Mac II incompatibility. It also runs a heck of a lot faster on a Mac II than it does on a Mac Plus or an SE, which means that it's almost tolerable.

Cricket Graph 1.1. This also seems to work fine; no glitches encountered at all.

FullPaint 1.1. It wouldn't allow me to open a window larger than standard Mac size; however, I was able to drag windows everywhere, including on the auxiliary screen. I couldn't drag tools over there, though. Most notably, the program crashed when I attempted to open a document outside the folder in which *FullPaint* resides.

SuperPaint 1.0. Unusable. It litters the screen with a set of little boxes across the top; anything you attempt to draw appears in those boxes, scaled down.

MacPaint 1.4. Well, yes, it is dated. I scrounged around, looking for a copy of version 1.5, but no luck. Version 1.4 does not work well on the Mac II. It performs the same little-box trick *SuperPaint* does.

MacDraft 1.2a. No problems encountered. It recognizes and uses the large display.

MacDraw 1.9.5. Likewise, no problems were encountered.

Phoenix 3D 1.0. Dead on launch. It crashed the system so thoroughly that even the power switch didn't work; I had to use the switch on my power strip to turn off the Mac.

Applications

Microsoft Excel 1.04. This spreadsheet works very well on the Mac II, adjusting to the large screen and automatically using the 68881 math coprocessor. No problems here.

MacProject 1.2. This works fine on the Mac II and even makes use of color: the project chart is done in blue, with the critical path (including tasks and milestones) in red.

4th Dimension 1.0.1. As you might guess, this database program (originally code-named "Silver Surfer") also works well on the Mac II.

More 1.1. I had heard rumors of problems with *More* on the Mac II, but none of my tests showed any bugs at all. *More* gets a clean bill of health.

Guide 1.0. This hypertext processor for the Mac appears to work without any problems on the Mac II.

Communications

MacTerminal 2.2. This runs on the Mac II and is usable, but it has one limitation: although you can open a terminal window larger than the regular Mac size using the ⌘-Option-drag technique, *MacTerminal* will only use a Mac-size portion of the window.

MicroPhone 1.0. A new version of *MicroPhone* is already out; I suspect it runs fine on the Mac II. Version 1.0, however, does not. It starts out OK, but crashes after a while.

AppleLink 4.0. Runs without any problems at all.

Languages

(A note on languages. None of the compilers used had the necessary libraries to call the new Mac II ROM/OS routines, such as the Color Manager. As a result, I was unable to write any nifty programs that put out lots of colors or used hierarchical menus. Can you imagine what it's like having a Mac II with a 19-inch color monitor and no real way to take advantage of it?)

MacTran77 2.0F. This version produces code for the 68020 and 68881 processors. The edit window is limited to the regular Mac size and location, as is the output from the demo programs.

MacFORTRAN 020 2.2c. This FORTRAN compiler also produces 68020/68881 code. I could compile and link the demo programs; however, when I ran them, the screen would clear, the program name would appear in the menu bar, and then I'd be returned to the Finder. I think the library needs some revamping.

Macintosh Pascal 1.0. Dies on launch, displaying a system error box.

Lightspeed Pascal 1.0. This fouls up and crashes very quickly. Think Technologies says it's close to releasing a version that has, in addition to Mac II compatibility, libraries for all the new ROM/OS routines.

Turbo Pascal 1.00a. This version has one glitch: after you've used it to compile and run a program, the System bombs when you return to *Turbo Pascal* once the program's done. Borland sent me a prerelease copy of version 1.00e, which works just fine.

Can you imagine what it's like having a Mac II with a 19-inch color monitor and no real way to take advantage of it?

TML Pascal 2.0. No problems here at all; I was able to edit, compile, link, and run programs without encountering any strange behavior.

Mac C 5.01 (68020/68881 version). Since a lot of folks are using this compiler to do Mac II benchmarks, you can guess that it does indeed work on the Mac II. No problems encountered.

LightspeedC 2.01. Although no immediate problems were apparent, I found increasing flakiness as time went on. Think Technologies has a patched version up on CompuServe, and a fully functional release should be out by the time you read this.

APL Plus 1.0. Not even close. I got a system error box when I started it up, and didn't even get that far when I double-clicked on an *APL Plus* source code file.

MacFORTH Plus 1.0. This started up without problem, but it displayed erratic behavior with some functions (such as backspacing). Although I had some other problems, I'm not sure if they were Mac II related or just a result of my unfamiliarity with the program.

Object Logo 1.0. Like *APL Plus,* this one died on launch.

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Desk Accessories

Acta 1.2. This outliner installed as a desk accessory does just fine on the Mac II.

Talking Moose 1.21. Sigh. My favorite desk accessory just won't run on the Mac II. Apparently, the main problem is that *Macintalk* doesn't work on the Mac II. With luck, someone may have fixed it by the time you read this.

Stars II. This DA works fine on the Mac II. It blanks both screens, picks a balanced origin (in this case, within the left half of the large screen), and shoots stars at you. Stars that trail off the left edge of the large screen appear on the right edge of the small one. Well done.

BlankScreen, FadeToBlank, Idle, MoireIdle, PolyIdle, ZoomIdle (all 1.1), *Stars* 1.3. All these screen-blanking DAs have the same problem: they work fine on a single screen but not on two. They blank and run on the main one, but leave the other screen unblanked and untouched.

Smart Alarms 2.5. This nifty alarm DA from Imagine Software, which I haven't used extensively, so far appears to work perfectly.

Appointment Diary 2.9. Another DA from Imagine Software, which also appears to work without problems.

Sleep. Another screen saver similar to *Idle,* which gives you a blacked-out screen and a bouncing Macintosh icon; it's bundled with the previous two DAs. Unfortunately, like the other screen-blanking DAs listed above, it only affects the large (main) screen and doesn't blank the small one.

Glue 1.05. A well-known DA from Solutions International. I had no problems with it at all.

SmartScrap 1.02. Also from Solutions International, this is a replacement for the Scrapbook. Again, no problems with it so far.

The Clipper 1.01. This comes with *SmartScrap* and is used for high-precision cutting and pasting. No problems so far.

SideKick 2.0. I've briefly tried out most of the DAs in this package; no immediate problems except the System's limit on DAs.

Games

Most games written for the Macintosh won't work on the Mac II. This is because game programmers tend to use every shortcut and wily trick they can think of. I grew tired of constantly rebooting my Mac II, so you may find this a less-than-comprehensive list. My apologies.

Balance of Power 1.03. I had no problems with this as long as I booted up with its disk. However, when I started up the Mac II with another disk, then put *Balance of Power* in the drive and double-clicked on it, it died right after it brought up the title screen.

Enchanted Scepters 1.0. This is one game that works well on the Mac II. The large screen isn't much use, but the sound and graphics come through fine. The only problem occurs when you quit: instead of rebooting the System, the game crashes it, so not even the power switch will work.

Most Mac games won't work on the Mac II because game programmers use every shortcut they can think of.

World Builder 1.0. This works very well on the Mac II. You'll probably want to use it to build your own games, since so many others don't work at all. The sound libraries also work well.

Strategic Conquest 1.0. There is a later version of this game already out, but the original actually works on the Mac II. When I started it, I got the funny small boxes across the top of the screen (as with *SuperPaint*), with some sort of squashed image loaded into them. After that point, though, the game ran just fine, and I managed to waste a good deal of time playing it.

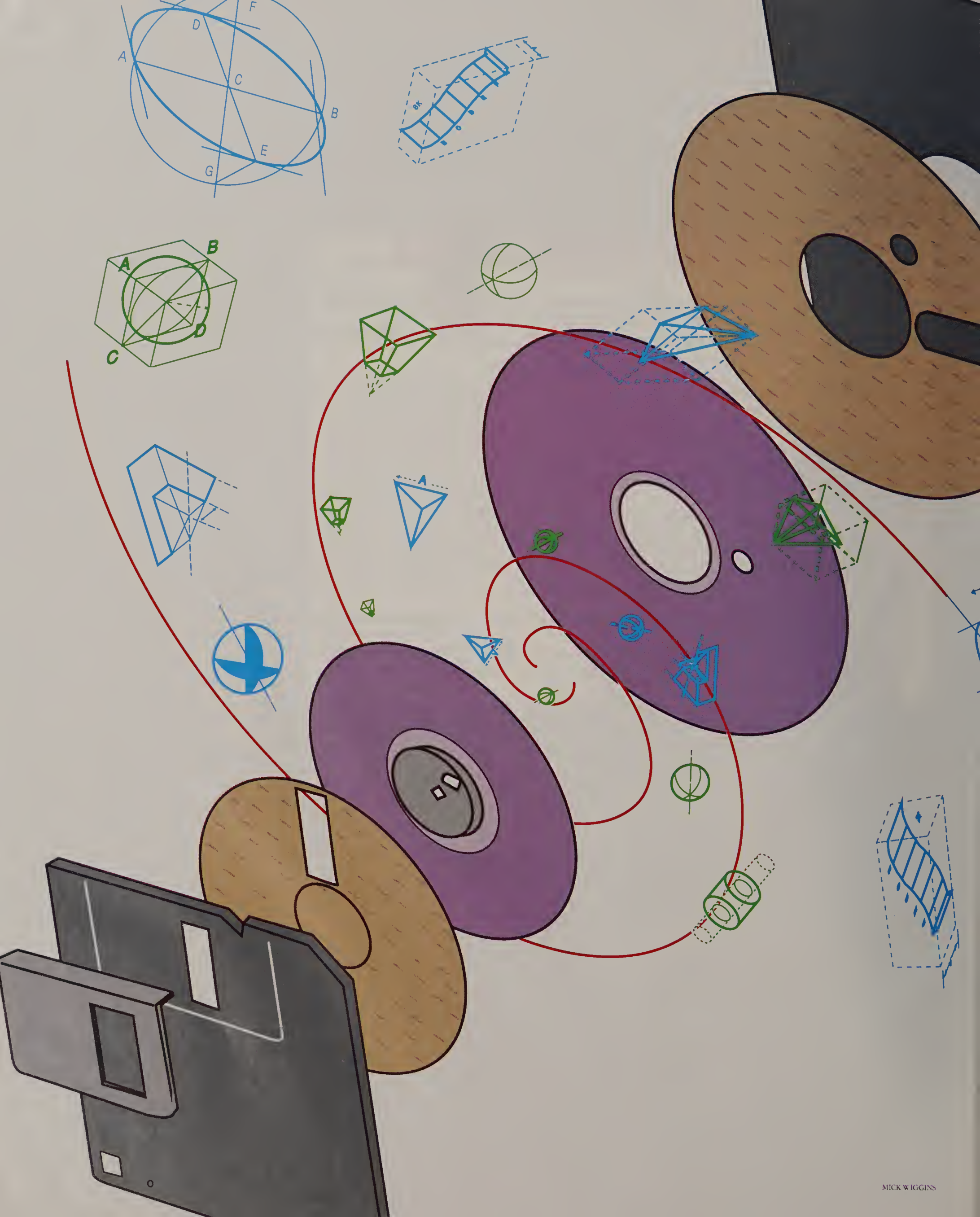
Chessmaster 2000 1.0. Dies a quick death.

Hardware Compatibilities

I had hoped to report on several SCSI hard disks, but only one manufacturer—General Computer—actually sent one. The HyperDrive FX/20 plugged right into the back of the Mac II and started up without incident. I had to run the Apple SCSI setup program to get the System to recognize the drive, but after that, things went without a hitch. I've transferred lots of files back and forth, run programs off both drives (the FX/20 and the internal Mac II hard disk), and have had no problems.

Looking Ahead

By choosing your software wisely, you can immediately become productive on a Macintosh II, even if your video configuration is a little strange. What's more, a Mac II with a large screen is parsecs ahead of the little beige toaster we all know and love. Market pressures will eventually encourage developers to clean up incompatible products, which will expand your options. Even more exciting will be the products designed specifically for the Mac II, to take advantage of its features and power. With luck, we the consumers will be the ultimate winners. □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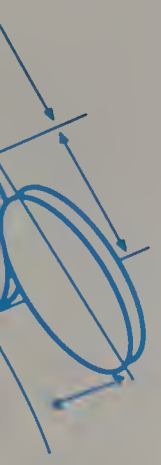
Benchmark: Mechanical CAD

Three Mac programs go function to function against AutoCAD

by David L. Peltz



In the past, when computer-aided design systems cost millions of dollars each, selecting a CAD program was easy. All you did was form a CAD selection committee to draw up a specification of system requirements, issue a request for proposals from CAD vendors, and send the selection committee on a nice long trip to visit all the vendors and run a benchmark.

Today micro systems are nearly as complex as their mainframe-based forebears, but in most cases the full weight of selecting a CAD package falls on the shoulders of you, the user. Finding a CAD package that effectively performs the kind of drafting and design work you do is a difficult and time-consuming undertaking. To help you, *Macworld* asked me to benchmark some of the leading Macintosh 2-D mechanical CAD programs.

Procedures

Earlier this year a publication called the *Computer-Aided Design Report* put together a CAD benchmark to test a group of mostly MS-DOS CAD programs (*CAD Report,* May and June, 1987). The test consists of 21 tasks, each of which is designed to highlight some aspect of CAD systems' functionality. With the *CAD Report*'s permission, *Macworld* borrowed their benchmark procedures.

The good thing about *CAD Report*'s approach is that the test's creators defined a set of tasks that bring out the features a typical mechanical designer actually uses, yet they realized that different users may put a different value on each of these core features. The *Macworld* testers assigned each task an importance factor between 1 and 10. This number reflected the testers' assessment of the importance of that aspect of a CAD system to their actual work. The importance factors are listed in Table 1.

Next the testers were asked to conduct the 21 tasks exactly as described, observing and recording the time and/or the number of operations it took to perform each task.

The testers' final step was to give their systems a performance rating of 0 through 10 for each task (see Table 1). For consistency among the testers, we provided detailed guidelines spelling out the degree of ease or difficulty denoted by each rating.

To get final scores, I averaged the importance factors of all four testers to achieve an average importance factor for each task. Those figures were then multi-

plied by the task performance ratings and totaled to produce overall scores.

The Packages

The three Macintosh programs included in the test were those that were commercially available at the time of the test (see "VersaCAD Comes to the Mac") and had the power and features necessary for professional mechanical design applications: *MGMStation* from Micro CAD/CAM, *Minicad* from Diehl Graphsoft, and Bridgeport Machines' *EZ-Draft*. *MacDraw* and *MacDraft* were excluded because they simply don't have the capabilities the other CAD programs do, and wouldn't have been able to compete.

Our fourth test subject, *AutoCAD* from AutoDesk, is the favorite of the MS-DOS world and was included for comparison purposes. AutoDesk claims to have delivered over 100,000 copies of *AutoCAD,* which makes it the most popular microcomputer-based CAD system in use today.

The Testers

Ideally, the judging panel for a benchmark such as this would be made up of people who were experts on every system being tested. In the real world, however, one is faced with a choice: either have the same group of people test all the programs, which would make the scoring process more consistent, or have only the people who really know a program put that piece of software through its paces.

The original authors of this benchmark followed the first option, which leaves them open to the criticism that perhaps certain programs would have fared better if their operators had had more experience on those systems. Since CAD systems are so complex and take so long to learn, for the *Macworld* test I decided to follow the second option and have the tests performed only by a panel of professionals who work day to day with the product they tested. The disadvantage of this approach is that it reduces the relative value of the scores, since each tester looks at only one system. The weighting system discussed earlier mitigates this problem, as it reflects a consensus view regarding the importance of the functions tested.

The testers were: Victor Anastasia, who uses *AutoCAD* at Trusco Tank in San Luis Obispo, California; Dennis Stewart, who works with *EZ-Draft* at Boeing in Seattle; Joe Lewis of the Hollywood/Tokyo Film Consortium in Chatsworth, California, who uses *MGMStation;* and Richard Wuthrich, who uses *Minicad* at Chicago PPL in Elk Grove Village, Illinois.

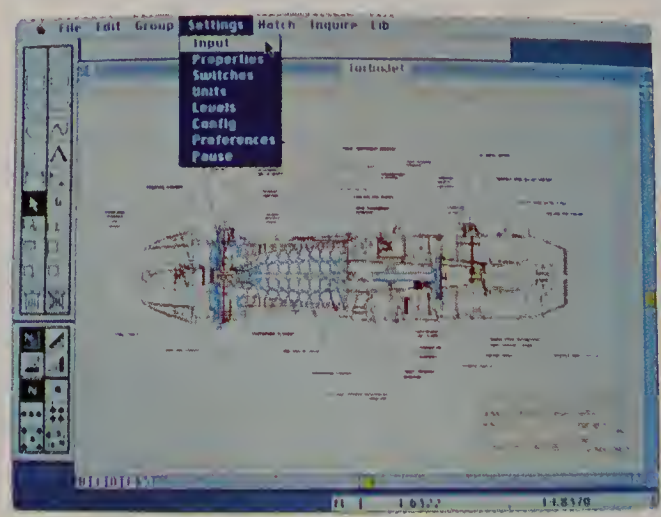
VersaCAD Comes to the Mac

The July announcement by Versacad Corporation that it was entering the Macintosh CAD software market with *VersaCAD/Macintosh Edition* brought an abrupt end to Macintosh skeptics' constant refrain: "If the Macintosh is such a good machine for CAD, why are there no major CAD software suppliers supporting it?"

VersaCAD/Macintosh Edition, however, is not just a ported-over version of the company's MS-DOS product. It's an extensive and completely new professional CAD package that fully adheres to Macintosh user-interface conventions and provides full support of the Clipboard. Translation files that interface with desktop publishing, paint packages, finite-element analysis, CAM, and other applications are also supported.

According to Visual Information, plans are in the works for eventually linking that company's *Dimensions* 3-D solid modeling software to the new *VersaCAD/Macintosh Edition,* as well.

On the basis of an early preview, *VersaCAD/Macintosh Edition* looks like it has the potential to become *the* Mac CAD program. The package will sell for $1995. Deliveries of final versions to users are scheduled to begin in December.



As this screen shows, VersaCAD/Macintosh Edition *lives up to its name: the program has been completely rewritten for the Mac.*

The Tests

Task 1: Tangency

This first task tests the CAD software's ability to work with tangents to circles or arcs. The task requires the operator to draw three unequal circles and then draw a new circle tangent to the original three.

Results: All four systems were able to perform the task, but with widely varying degrees of difficulty. The *AutoCAD* tester gave this task the highest score, but the lowest importance factor. The *MGMStation* tester had the easiest time doing it.

Task 2: Accuracy

One factor in determining mechanical design's ultimate accuracy is how well the CAD software calculates the intersection of curved entities such as arcs or circles. Task 2 requires the operator to draw a point at specified coordinates and then to draw two circles tangent to the point. The operator next erases the point and asks the system to create a new point at the intersection of the two circles. The new points' coordinates should match those of the original point.

ED KASHI

AutoCAD *tester Victor Anastasia uses the Mac to design outdoor storage tanks. Working with a computer is particularly efficient for him because so much of his work is repetitive.*

Results: AutoCAD was the only one of the four systems to show any deviation between the original coordinates and the final ones, yet the *AutoCAD* tester gave his system the highest score. In other words, it was easy for this tester to get the least accurate answer. No tester gave this task an importance factor lower than 8.

Task 3: Radial Grids

All 2-D CAD systems use an *x-y* Cartesian coordinate system to describe locations. Sophisticated CAD software enables users to define points using other coordinate systems as well, including radial grids. For Task 3, the tester draws points, circles, and symbols by specifying their bearing angle and distance from an origin in a polar coordinate system.

Results: The *Minicad* tester had the greatest trouble with this task and gave his program the lowest rating. *MGMStation* and *AutoCAD* were tied at the top–both for importance and ease of performance.

Task 4: Rotate Gear Teeth

For this task, the tester draws a simple gear tooth and then copies it at equally spaced intervals around a circle, rotating the tooth with each copy. The testers are asked to supply the time it took them to complete this task and to rate the software's performance.

Results: Minicad performed this test in only 150 seconds. *AutoCAD* took 170 seconds, *EZ-Draft* took 300 seconds, and *MGMStation* took 600 seconds. Although *Minicad* performed this test faster than the other programs, the *Minicad* tester was not personally satisfied with his system's performance; he gave his program the lowest rating.

Task 5: Copy, Rotate, Mirror

Mechanical design often involves the creation and duplication of complex objects that are symmetrical about an axis. If you need only draw half an object and then can produce the rest by copying, rotating, or mirroring that half, you can greatly reduce your drawing time. This task examines a program's ability to perform those functions.

Results: Minicad and *AutoCAD* were able to do this task with the fewest number of operator steps. *EZ-Draft* took the most steps. All testers gave their systems a 10 in ease of performance and all gave it a very high importance factor.

Task 6: Circumscribed and Inscribed Polygons

Single-step routines for drawing squares, circles, and rectangles are common. Less common are easy-to-use routines for creating unusual polygons. In this test, a circle is used as the basis for constructing seven-sided polygons. The operator is asked to draw a circle and then circumscribe it and inscribe it with seven-sided polygons.

Results: EZ-Draft took only two steps to perform this task. *AutoCAD* took three, *MGMStation* took five, and *Minicad* took seven. The operators assigned this task widely varying importance factors: the *MGMStation* tester thought it was a 9; the *EZ-Draft* man gave it an an 8; the *Minicad* operator gave it a 5; and the *AutoCAD* tester, only a 4.

Task 7: Constructing Fillets and Chamfers

This test comprises three parts. First, the operator draws two circles of unequal size and then connects them with the eight possible fillets (see figure). This demonstrates the flexibility and the geometric construction power of the CAD software.

Results: Neither *AutoCAD* nor *Minicad* was able to complete this drawing. Their testers were able to draw only two of the eight fillets. *EZ-Draft* was able to do all eight fillets in 60 seconds, while *MGMStation* took 150 seconds.

In the second part, the tester draws two arcs, connects them with a circular fillet of a specified radius, and trims the arcs at the point where they meet the fillet.

Results: Minicad was unable to perform this test. *EZ-Draft* did it in 2.5 seconds, whereas *AutoCAD* took 26 seconds and *MGMStation* took 150 seconds.

For the third part, the operator draws two perpendicular lines and then chamfers them (see figure). The test asks the operator to note whether the program prompts for the length of the chamfer or for its distance from the corner (which is preferable).

Results: Here again the times varied considerably. *EZ-Draft* completed the test in 2.5 seconds, *MGMStation* took 20 sec-

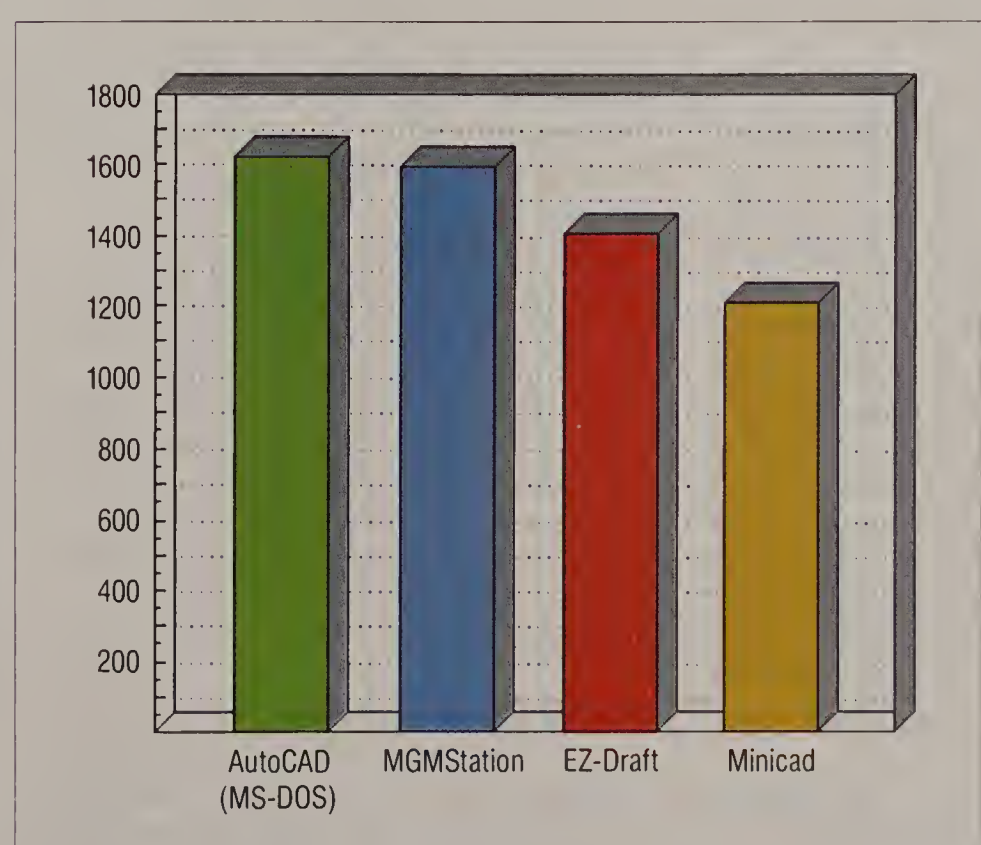
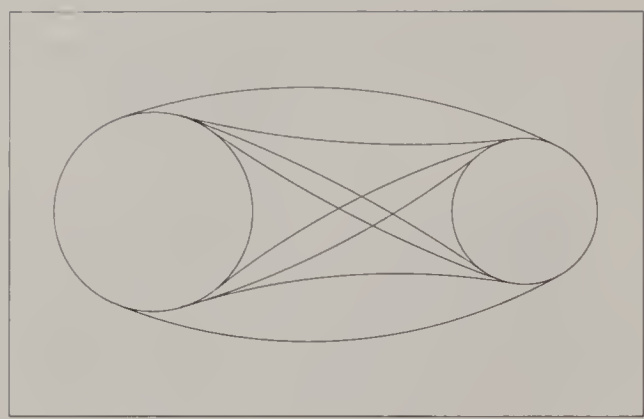
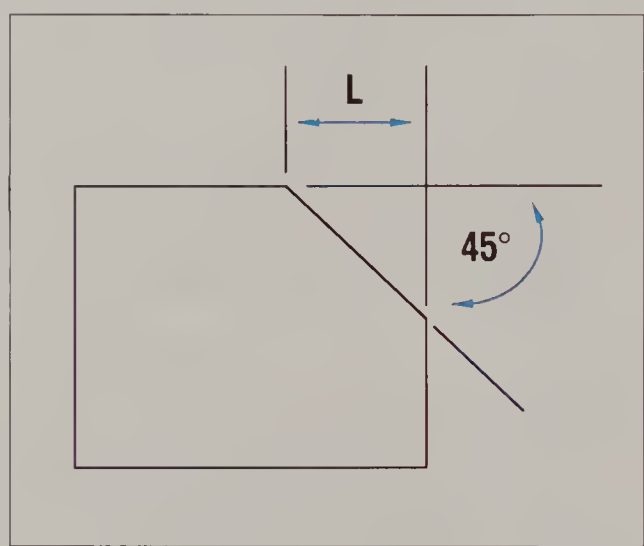


Figure 1
What's all the fuss over AutoCAD? *As you can see, the final scores were quite close—proving the Mac can back it as a CAD machine. One reason these results don't show more variation is that we tested only the most suitable programs and excluded programs like* MacDraft, *which we know to be less acceptable for rigorous mechanical design work.*



Task 7: Fillets
In the first part of this task, the tester draws the eight possible tangent fillets between two circles of unequal size.



Task 7: Chamfers
For the third section of this task, the tester draws two perpendicular lines and chamfers them.

onds, *AutoCAD* took 21 seconds, and *Minicad* came in last with 25 seconds.

Overall results: Minicad received an overall rating of only 2, while the others all received 9 or 10.

Task 8: Orthogonal Projections

For this task, the testers constructed top, front, side, and isometric views of the same object (see figure). The overall time required to do this provides some indication of the system's ability to construct multiple views. The task also examines the software's isometric projection capability.

Results: Minicad's 3-D capabilities allowed its tester to draw all four views in only 40 seconds. It took 120 seconds to do the drawings on *MGMStation,* 502 seconds on *AutoCAD,* and 600 seconds with *EZ-Draft*. These time differences stem from the wide variation in the tools available for orthographic projections in the different programs.

Interestingly, the testers' ratings didn't range nearly as much as did the times. *Minicad* and *MGMStation* each received a 10, *EZ-Draft* received a 9, and *AutoCAD* received the lowest score—an 8. For importance factors, *EZ-Draft*'s tester gave it a 9 rating, *MGMStation* and *AutoCAD* both received 7, and *Minicad* received only a 6. These results seem to suggest that the better and faster a program was, the more the tester took its capabilities for granted.

Task 9: Analysis

Hand-made drawings convey only the information that's visible. Drawings made using CAD have the potential for supplying additional data. Since CAD drawing geometry is mathematically defined, all points, locations, angles, distances, and lengths should be accessible by the CAD software.

There are three parts to this task. First, the tester draws a point, a line, an arc, and a circle, and then asks the system to list the properties of each. Ideally, the CAD software should provide the endpoint coordinates of the line and arc, the center coordinates and radii of the arc and circle, the layer on which each entity is located, and the line type or font.

Results: Only *Minicad* had problems performing this part of the test.

The second part looks at a system's ability to measure relative distances. The testers were asked to measure the distances between two parallel lines and between two arcs or circles.

Results: Again, only *Minicad* had problems.

The final section of this test asks the operators to draw a rounded slot of length l and width w (see figure). The rounded ends are of diameter w. The operators then asked their systems to calculate the area of the figure. The CAD software's answer was compared to the results of the following formula: Area $= (\pi/4 - 1)w^2 + lw$.

Results: In a surprise comeback, *Minicad* was the only program with exact correlation of the two area calculations. The three others showed very small variations (on the order of .0001 to .003 square inches). *EZ-Draft* had the largest variation.

Overall results: All the operators gave this test a high importance factor. *Minicad* received the lowest ease-of-performance rating, a 7. All others received a 10.

Task 10: Layering

Layering functions enable a designer to group information selectively and then either display or hide specified parts, as well as to select and combine separate drawings to produce assembly drawings.

To complete this task the testers had to take the polygons and circle from Task 6 and: (1) move the inscribed polygon to one layer and the circumscribed polygon to another; (2) move the polygons so they no longer align with the circle; (3) move the polygons back on top of the circle; and (4) verify that the inscribed polygon vertices are on the circle and that the edges of the circumscribed polygon all are tangent to the circle.

Results: Although *MGMStation* does not have a true layering capability, the tester was able to work around this by using other facilities. Not surprisingly—since if he needed layering for his work he wouldn't use *MGMS*—this tester assigned this task a low importance factor. All the other systems had no difficulties with layering, and all the testers gave their systems high ratings and the test a high importance factor.

Task 11: Merge and Insert

This task examines the CAD software's ability to combine and manipulate

ED KASHI

Tester Dennis Stewart has used EZ-Draft *since it came out. He works as a technician designing aircraft production equipment at Boeing.*

MICHAEL ABRAMSON

Mechanical engineer Richard Wuthrich, our Minicad *tester, regularly uses* Minicad's *3-D mode to model the diesel injection lines he designs.*

previous work. The testers were asked to take any two drawings created for the previous tests and check to see that drawings and parts of drawings can be inserted into new drawings at any coordinate, angle, rotation, or size, and on any layer.

Results: All the systems did very well on this task.

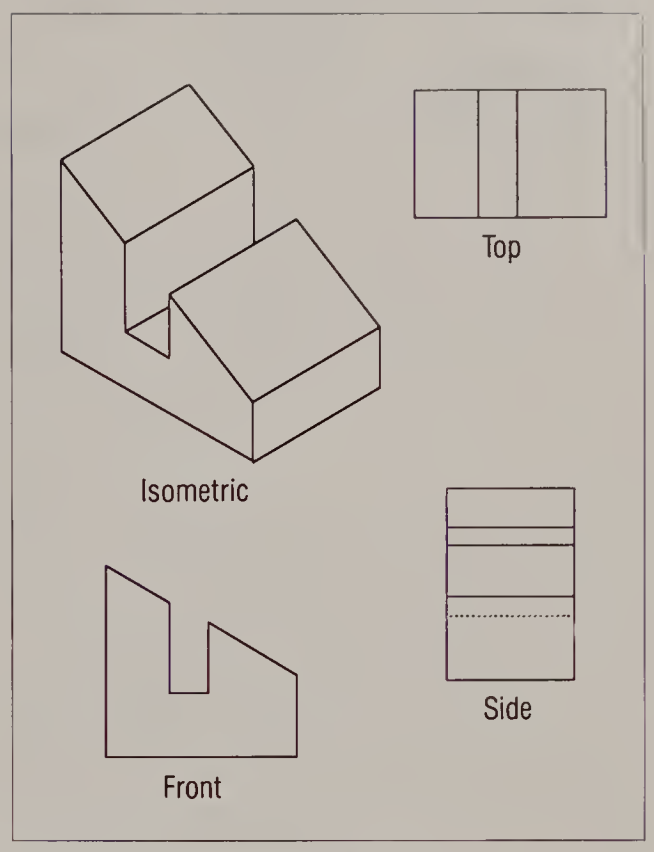
Task 12: Dimensioning

Dimensioning a drawing can be one of the most time-consuming parts of drafting. CAD programs vary widely in their dimensioning capabilities. Once defined and placed on a drawing, dimensions are easier to change on some CAD systems than on others.

For this task, the testers constructed a specified object and then dimensioned it with particular angle and radius dimensions in specified formats (see figure). The testers noted how hard it was to move dimensions or to change the text within them after they have been placed. The testers were also asked to note the time it took them to dimension the drawing, whether the software allows a user to flip arrowheads inside and outside of extension lines, and how many operations it takes to make these kinds of editing changes.

Results: Drawing the object was easy on all systems. However, the times varied by as much as a factor of ten: *MGMStation* took 120 seconds, *AutoCAD* 290 seconds, *EZ-Draft* 900 seconds, and *Minicad* 1200 seconds. The times for dimensioning the object were: *MGMStation* 210 seconds, *EZ-Draft* 300 seconds, *AutoCAD* 330 seconds, and *Minicad* 2400 seconds. There was also a hidden trick in this task. The types of notations on the dimensioning in the example (such as "60 Deg°") were not what most of the systems automatically produced. Only the *AutoCAD* tester followed the example 100 percent by editing all his annotations.

All the programs except *Minicad* have the ability to flip arrowheads. *EZ-Draft* required the most steps to edit dimensioning notations.



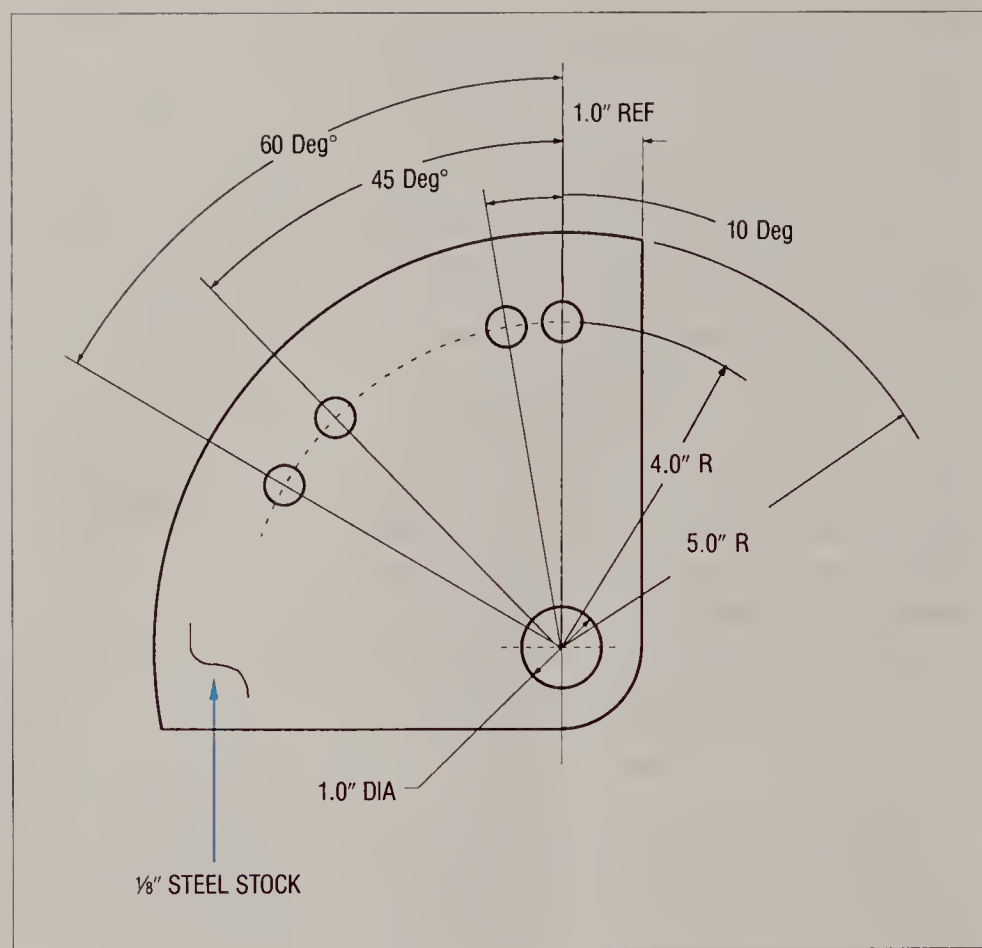
Task 8: Orthogonal Projection
Four views of an object (front, top, side, and isometric) are drawn.

Overall Scores

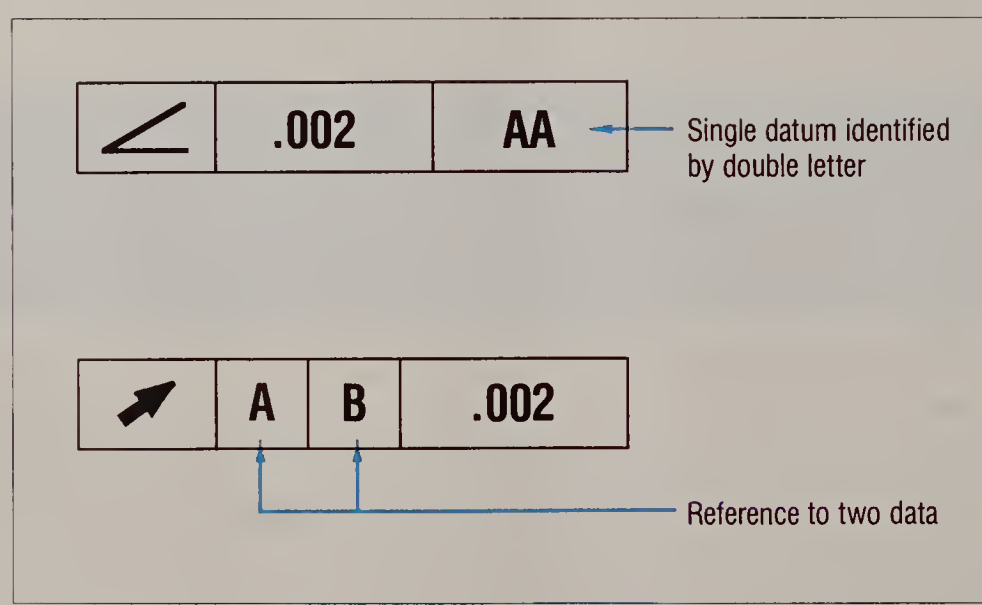
Task	AutoCAD Importance	AutoCAD Rating	MGMStation Importance	MGMStation Rating	Minicad Importance	Minicad Rating	EZ-Draft Importance	EZ-Draft Rating	Average Importance
1. Tangency	2	**10**	10	**8**	7	**3**	9	**3**	7.00
2. Accuracy	10	**10**	10	**9**	8	**8**	9	**4**	9.25
3. Radial grid	10	**10**	10	**10**	8	**5**	9	**9**	9.25
4. Rotate gear teeth	10	**8**	10	**8**	7	**5**	10	**9**	9.25
5. Other translating capabilities	10	**10**	10	**10**	9	**10**	10	**10**	9.75
6. Circumscribed/inscribed polygon	4	**10**	9	**8**	5	**7**	8	**9**	6.50
7. Constructing fillets and chamfers	9	**9**	10	**9**	7	**2**	9	**10**	8.75
8. Orthographic projection	7	**8**	7	**10**	6	**10**	9	**9**	7.25
9. Analysis	10	**10**	10	**10**	9	**7**	8	**10**	9.25
10. Layering capabilities	9	**10**	8	**10**	9	**9**	9	**10**	8.75
11. Merge/insert capabilities	10	**10**	10	**10**	9	**9**	9	**9**	9.50
12. Dimensioning	10	**9**	10	**10**	9	**8**	10	**10**	9.75
13. Feature control symbols	10	**10**	8	**10**	4	**8**	9	**9**	7.75
14. Speed	10	**10**	7	**8**	7	**10**	10	**10**	8.50
15. Memory	10	**10**	7	**10**	9	**10**	10	**9**	9.00
16. Directory management	10	**10**	9	**10**	8	**8**	10	**9**	9.25
17. Programmable tablet menu	5	**10**	1	**8**	2	**0**	8	**0**	4.00
18. Parametric programming	4	**10**	6	**8**	8	**1**	8	**3**	6.50
19. Documentation/online help	10	**8**	7	**8**	9	**6**	9	**7**	8.75
20. Installation/flexibility	10	**10**	9	**10**	9	**9**	9	**9**	9.25
21. Operator's personal assessment	10	**9**	10	**10**	8	**9**	9	**9**	9.25
Sum		**201**		**194**		**144**		**167**	

Table 1
Before running the benchmark, the four testers assigned importance factors of 1 to 10 to each of the 21 tasks (see the Importance columns). The numbers in the Rating columns reflect the tester's assessment of his program's performance on each task. To achieve the final scores, the individual ratings were multiplied by the averages of the importance figures (see Figure 1).

Task 12: Dimensioning
The object is drawn and dimensioned as shown.



Task 13: Feature Control Symbols
The two feature control symbols are to be produced by the CAD system.



Task 13: Feature Control Symbols

Some CAD systems enable you to produce common feature control symbols automatically, while others require that symbols be manually constructed as small, annotated drawings.

For this task, the testers produced two feature control symbols according to ANSI Standard Y14.5 (see figure). They then checked to see how easy it is to change the symbols. If a system generated the symbols automatically, the tester was asked to check whether the symbols conform to ANSI or ISO standards.

Results: Only *Minicad* lacked facilities for generating these blocks. The other systems were fully equipped for this function; *MGMStation* and *AutoCAD* were tied with 10 for ease of use, *EZ-Draft* rated a 9, and *Minicad* got an 8.

Task 14: Speed

Users of slow CAD software can spend more time waiting for their system to redraw, pan, and zoom than they spend drawing. Both software and hardware affect the time it takes to do these operations, and it's difficult to separate the effects of each.

The following equipment was used for the *Macworld* benchmarks: with *Minicad,* a 1-megabyte Mac SE with a 20MB internal hard disk; *EZ-Draft,* a 2MB Mac 512KE with a 20MB hard disk; *MGMStation,* a Mac 512K with a HyperDrive; *AutoCAD,* an 892K IBM PC AT with a 30MB hard disk. No one indicated the use of accelerators.

This test comprises five timed tasks; each task is assigned a different weighting. First the testers constructed a drawing of 1300 entities by creating a simple figure (a square with rounded corners containing a point and text) and copying it into a 10-by-10 array. The time it took to make the copies was noted (weight for this test: 1). Next the tester filed the 10-by-10 figure away on disk and recalled it, noting the time it took to load the drawing (weight: 2). The third part tested the time it took to zoom from viewing the full array down to only one part (weight: 6). For the fourth, the operator noted how long it took to zoom back out to the full array (weight: 6). The final test asked the operator to redraw the figure using a redraw function (weight: 5).

Results: To score this test, I multiplied the times by the weights and totaled their products (see Table 2). The lower the number, the faster the system. The testers also assigned a rating based on ease of performance; *MGMStation* got an 8, the rest received 10.

Task 15: Memory

With their 1MB or more of RAM, Macintoshes should be less likely to run out of memory than MS-DOS machines, which can't directly address more than 640K. To see whether memory might run out during a drawing session for a reasonably complex object (about 5200 entities), the testers were asked to copy the 10-by-10 array from Task 14 four times and to note if the system failed or ran out of memory.

Results: Only *EZ-Draft* ran out of memory, even though its tester had the most RAM (2MB).

Task 16: Directory Management

MS-DOS users aren't blessed with the Mac's Finder, so MS-DOS CAD software should provide some of the Finder's functions. In a CAD environment, for example, designers need to be able to get at previously stored drawings in many ways.

This task asked the testers to check whether their system enables them to sort a drawing list by name, date, or other variables. The testers also noted whether their system allowed them to copy, rename, or delete drawings without having to quit the CAD program. On a Mac, the results were very predictable.

Results: All three Mac testers were able to display drawing lists sorted by name, date, size, kind, and icon. *AutoCAD* can sort by name, date, drawing extension,

and subdirectory. All four testers were able to copy and rename drawings while still in CAD, but only *AutoCAD* could delete drawings without having to exit to the operating system.

Task 17: Programmable Tablet

The original authors of this benchmark assumed that their IBM audience would be using a tablet, and simply asked whether the system enabled the users to program their tablets. For this test, the operators were also asked whether their systems require a tablet and if a tablet can be used. The testers were also asked to consider the ease with which their system let them program tablets to create or group functions.

Results: None of the systems requires a tablet, but all except *Minicad* can use them. The *AutoCAD* tester was the only one who reported programmability as a built-in function. Although this capability won *AutoCAD* a 10, the *AutoCAD* tester thought this feature worth only a 5 importance factor. The *EZ-Draft* tester, on the other hand, believes tablets have an importance of 8, even though his system earned a 0.

Task 18: Parametric Programming

Parametric programming capabilities enable a user to tell the software to perform complex functions automatically. Some people would call these macros.

Unfortunately, none of the Mac CAD systems offers programming capabilities. Even though we knew this going in, we asked the testers to note whether their program includes a language or means for stringing together series of commonly used operations and to judge whether the language has most of the features of a computer programming language. (Mac CAD software developers should take note of their low scores in these areas.)

Results: AutoCAD, with its AutoLISP language, rated highest. The *MGMStation* tester apparently found a way to work around that program's lack of a built-in language, since he gave the program an 8. *EZ-Draft* received a 3; *Minicad* received a 1. Once again, the testers who lacked features seemed to be trying to send a message to developers, while the testers with the features take them for granted. The *Minicad* and *EZ-Draft* testers assigned this test an importance factor of 8, the *AutoCAD* tester gave it a 4, and the *MGMStation* tester gave it a 6.

MAX AGUILERA-HELLWEG

Tester Joe Lewis has been using MGMStation *for three years to design motion picture equipment and animation models—like this pterodactyl.*

Task 19: Documentation and Online Help

We asked the testers to examine the documentation supplied with the CAD software and to give heavy weight to thorough indexing, clear illustrations, online tutorials, and reasonable explanations of how to work each function.

Results: MGMStation and *AutoCAD* both received 8. *EZ-Draft* got a 7; *Minicad* was at the bottom with a 6. The importance factors were in the 9 to 10 range, except for the *MGMStation* tester, who thought documentation is worth a 7.

Task 20: Installation

Installation is something we take for granted on the Mac. In the MS-DOS world, the process can involve up to a dozen or more disks and a great deal of trouble. This task takes into account the ease of installing of the software.

Results: As expected, *AutoCAD* takes more steps (6) and more time (900 seconds) to install than any Mac package. The worst Mac package installed three times faster and took half as many steps. All testers thought this was important.

Task 21: Personal Assessment

This task is the most subjective, but it may also be the most important. We asked the testers to ask themselves the following question: Would I really like to do all my design and drafting work with this software? If the answer was an unqualified yes, the system rated a 10.

Results: If you're among the skeptics who doubt that personal computers—and the Mac in particular—are ready for CAD, the scores for this test should give you pause. All the products were rated 9 or 10, which shows that these CAD users are very satisfied. What these scores can't tell you is which system is the best. This is the relative value problem I mentioned earlier.

Software	Raw Score (seconds)	Weighted Score
AutoCAD	60.13	139.85
Minicad	72.00	145.00
EZ-Draft	253.00	504.00
MGMStation	248.00	487.00

Table 2
Results of speed tests in Task 14.

Under "Comments," the *AutoCAD* tester remarked that his system is slow in picture regeneration; the *EZ-Draft* tester gave his system two ratings, a 10 on a Mac II and a 9 on a Mac Plus.

Bottom Line

As I warned at the start, it's impossible to construct a single CAD benchmark that's both meaningful and objective. While the results of this benchmark suffer somewhat from the fact that the different testers have different ideas about what's good and what's important, the tests do reveal a lot about the capabilities of Mac CAD software. They should also make you aware of what the issues are when you're evaluating CAD packages. If you decide to duplicate this test yourself, think carefully about the functions that are most important to you; drop items that aren't relevant to your work and add other tests as required.

As you can see from Figure 1, it was a close race. Depending on how you score the test, *MGMStation* is either the winner or the runner-up behind *AutoCAD*. *MGMStation* loses according to the averaged scores and wins according to the individual scores.

In the end, the most important thing these tests reveal is that there's no dramatic difference between the functionality of *AutoCAD* and the Macintosh packages. It would appear that *AutoCAD*'s popularity is more the result of marketing and support strengths than technical superiority.

As more mechanical designers discover the Macintosh, its share of the CAD market will increase, which will mean even better products for consumers. Perhaps AutoDesk will even follow Versacad's lead and come out with a true Mac version. □

Excel Macro Treasury

Top Excel experts offer their macro masterworks

by Mary V. Campbell

Excel's macro facility is one of the package's strongest features. By letting you group sequences of complex commands into files that can be activated with a single keystroke, macros save time and aggravation.

Although *Excel*'s macro command language is easier to learn and use than some others, mastery of it still requires study, practice, and patience. Even with the record feature, which automatically reproduces a sequence of keystrokes, creating a macro can be a formidable task for a new user. Add branching and other logic to the macro structure, and the macro debugging process may raise a novice's frustration level to intolerable heights.

One way to smooth the learning path is to borrow macros written by experienced *Excel* users. These macros are already in working order, and even if you need to modify one, the basic logic shell is complete. Not only do ready-made macros save time initially, they introduce you to techniques that you can add to your own macros as you gain experience.

Where will you find experienced *Excel* users willing to share their macros? Business associates, user groups, and bulletin boards are good possibilities. Another option is to explore the books that have been written about *Excel* macros. This article presents a few macros from a book I have written on the subject (*Excel Macro Library,* Que Corporation, 1986), as well as macros from other sources.

See Me in Ten Days

Excel Macro Library covers both function and command macros. Our first selection from the book, Plus Weekday, is a function macro for finding a weekday that's a specified number of days from the current date (see Figure 1). The macro must do more than simply add the number of days to the current date, since that sum could fall on a weekend or holiday. Weekday has many scheduling applications: homeowners, for example, might calculate a loan due date with it; doctors might use it to schedule follow-up visits.

The first section of Plus Weekday performs housekeeping functions, including setting the weekday flag (C1) and the holiday flag (C2) to 0 (both will be set to 1 when a nonholiday weekday has been generated). The next section checks whether the date generated by adding the specified number of days to the initial date is a weekday. If the projected date does not pass the test, the macro adds one day and checks again.

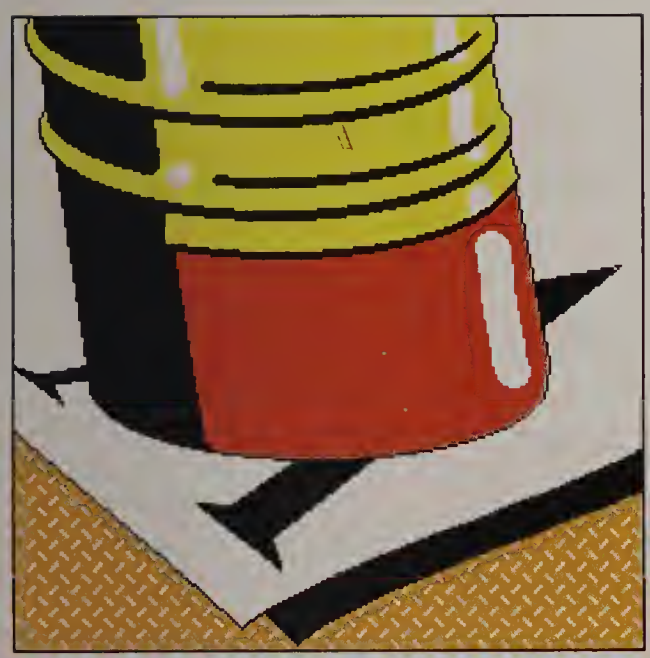
The Check Holiday routine in the example knows about only two holidays. Their dates are stored in B33 and B34. If the projected date matches either of these values, it is a holiday.

The macro manipulates the projected date until it reaches a nonholiday weekday, and then returns that date. You can add more dates to the Check Holiday routine by placing additional holiday dates in B35 and subsequent cells; to place more IF statements in the macro, add lines below A33 and create statements that follow this pattern:

=IF(CHECKDATE=B35,SET.VALUE(C2,0))

shows output from Plus Weekday.

ILLUSTRATIONS BY MAX SEABAUGH



You can perform calculations with function macros like this one by recording the name of the macro sheet, the function macro name, and the macro's arguments (enclosed in parentheses) in the worksheet cells. You cannot execute function macros from the macro menu or with a command option sequence the way that you can execute command macros.

Mail Call

The second example from *Excel Macro Library* is a command macro that creates mailing labels from database records (see Figure 2).

The first instruction in Create Labels is a SELECT statement that in turn contains an INPUT statement. The instruction displays a prompt that asks you to select an area of the worksheet to receive the labels. The subsequent instructions select the top row of that area and an arbitrary limit of the next 500 cells as the label area; you can easily increase the limit to accommodate additional labels. The instruction in line 6 assumes that the database was set before the macro was executed. Lines 7 through 9 determine the maximum number of rows (since this equals the number of labels to be generated) and set other counters.

The next section of the macro, Top Loop, is the real workhorse. It builds each line of the label by accessing a row of data in the database. Instructions in this section increment the line and label counters, check to see if the macro has constructed the last label, and branch to the beginning of the loop. When Top Loop has completed its task, it selects the label area so you can prepare to print the labels. Depending on the size of your stickers, you may wish to add an extra blank line between labels by changing the +3 in line 23 to +4.

Search Me

The next selection, Locator, comes from the *Complete Book of Excel Macros,* by Louis Benjamin, Don Nicholas, and the consultants of Lighthouse Publishing Services (Osborne McGraw-Hill, 1986). This book serves the needs only of relatively sophisticated *Excel* users, since it assumes a basic grounding in the *Excel* macro language. However, for the user who doesn't require a lot of explanation, this valuable collection offers some unique macros.

Locator is designed to select records in a database according to preestablished criteria (see Figure 3). It is useful for doing searches that you execute on a periodic basis or each time the database is updated. For example, before producing certain reports, you might find it valuable to check your data for errors. With the proper search criteria in place, Locator makes implementing this safety measure a snap.

The macro begins in A24 by activating the database window containing the search criteria. The criteria window should be set prior to executing the macro and can contain any valid criteria. The macro generates an alert box asking you to confirm that the criteria have been set.

The window containing the database to be searched is activated, and the area named srch_db is selected prior to executing the macro.

Lines 33 through 43 of the macro make up a loop that finds the next record and checks to see if you want to continue searching.

Error Eradication

Douglas Hergert's book *Microsoft Excel with Macros* (Microsoft Press, 1986) is in some ways the opposite of the *Complete Book of Macros:* it concentrates on explaining *Excel*'s macro facility, rather than providing a macro library. The book does contain some useful examples, however.

Anyone who has ever made a series of data-entry mistakes will appreciate the first macro we'll look at from this book. Called FixCase, it's a command macro designed to correct string values entered inconsistently into a worksheet (see Figure 4). The macro standardizes all the selected entries in a database to the format used for proper nouns (initial capitals only) regardless of what form was used for data entry.

FixCase begins by establishing string values for uppercase and lowercase letters. Line 5 determines the number of rows in the selection. The value of the first cell is determined and is ignored if it is not a string. The command macro invokes a function macro that provides the value of the current cell as the function argument.

The first function macro, UpperLower, calls the function macro Upper to convert the first character to uppercase. Next, the function macro Lower kicks in to convert the remainder of the character string to lowercase. The two pieces are joined together and returned to the command macro FixCase, which then looks at the next cell in the column.

To Whom It May Concern

Our last macro creates form letters (see Figure 5). The example in the book generates the library overdue notice shown in Figure 6, but you can adapt this macro to create form letters for billing, appointment scheduling, or any other purpose. The macro checks a database (not shown) of library information to see if the current date is past the due date for a given book. If it is and if the book has not been returned, the macro generates an overdue notice.

Before executing the macro, you must have entered the search criteria into a worksheet residing in the database to be searched. The criteria area should contain the code Rtnd with a value of False beneath it and NOW()-Date>15 with a value of True. Once the criteria have been entered, invoke the Data Set Criteria command.

The main macro begins by setting up the printer and opening the library information database. It checks for a record matching the criteria and copies the appropriate fields to the notice after activating it. The cycle continues with the database reactivated for a look at the next record.

End

The books represented here provide ready-to-use macros that will have you feeling like an expert in short order. And the advice offered by the authors will raise your skill level enough to justify that confidence. Keep practicing, and before you know it you'll have a macro collection of your own to share. □

For information on the books mentioned in this article, see *Where to Buy*.

	A	B
16	**Plus_Weekday**	
17	=ARGUMENT("DAYS_PLUS",1)	
18	=ARGUMENT("DATE",1)	
19	=DATE+DAYS_PLUS	
20	=SET.NAME("CHECKDATE",A19)	
21	=SET.VALUE(C1,0)	
22	=SET.VALUE(C2,0)	
23	**Chk_Wkday**	
24	=SET.VALUE(C1,1)	
25	=IF(AND(WEEKDAY(CHECKDATE)>1,WEEKDAY(CHECKDATE)	
26	=SET.VALUE(C2,0)	
27	=SET.NAME("CHECKDATE",CHECKDATE+1)	
28	=GOTO(Chk_Wkday)	
29	**Check_Holiday**	
30	=IF(AND(C1=1,C2=1),GOTO(Return))	
31	=SET.VALUE(C2,1)	
32	=IF(CHECKDATE=B33,SET.VALUE(C2,0))	
33	=IF(CHECKDATE=B34,SET.VALUE(C2,0))	29944
34	=IF(AND(C1=1,C2=1),GOTO(Return))	29951
35	=SET.VALUE(C1,0)	
36	=IF(NOT(C2=0),GOTO(Chk_Wkday))	
37	=SET.NAME("CHECKDATE",CHECKDATE+1)	
38	=GOTO(Check_Holiday)	
39	**Return**	
40	=CHECKDATE	
41	=RETURN(A40)	
42		
43	**Day_of_Week**	**DAY #**
44	=ARGUMENT("DATE",1)	1
45	=VLOOKUP(	
46	=RETURN(	

=IF(AND(WEEKDAY(CHECKDATE)>1,WEEKDAY(CHECKDATE)<7),
GOTO(Check_Holiday))

Figure 1

The Plus Weekday macro provides an example of flags set to monitor whether conditions have been met. Lines 32 and 33 also show how serial date numbers can be stored in other cells on the macro sheet and checked with IF statements. (Line 25 is shown in its entirety at the bottom.)

	A
1	**Create_Labels**
2	=SELECT(INPUT("Select top cell in column to be used for label construction",8))
3	=SET.NAME("TOP_ROW",SELECTION())
4	=SELECT(TOP_ROW:OFFSET(TOP_ROW,500,0))
5	=SET.NAME("LABELS",SELECTION())
6	=SELECT(!DATABASE)
7	=SET.NAME("MAXIMUM",ROWS(SELECTION()))
8	=SET.NAME("COUNT",1)
9	=SET.NAME("LABEL_COUNT",1)
10	**Top_Loop**
11	=SELECT(INDEX(LABELS,LABEL_COUNT,1))
12	=SEARCH(" ",INDEX(!DATABASE,COUNT,5),1)
13	=MID(INDEX(!DATABASE,COUNT,5),DEREF(A12)+2,LEN(INDEX(!DATABASE,COUNT
14	=FORMULA(A13)
15	=SET.NAME("LABEL_COUNT",LABEL_COUNT+1)
16	=SELECT(INDEX(LABELS,LABEL_COUNT,1))
17	=MID(INDEX(!DATABASE,COUNT,6),1,LEN(INDEX(!DATABASE,COUNT,6)))
18	=FORMULA(A17)
19	=SET.NAME("LABEL_COUNT",LABEL_COUNT+1)
20	=SELECT(INDEX(LABELS,LABEL_COUNT,1))
21	=MID(INDEX(!DATABASE,COUNT,7),1,LEN(INDEX(!DATABASE,COUNT,7)))
22	=FORMULA(A21)
23	=SET.NAME("LABEL_COUNT",LABEL_COUNT+3)
24	=SET.NAME("COUNT",COUNT+1)
25	=IF(COUNT>MAXIMUM,GOTO(A27))
26	=GOTO(Top_Loop)
27	=SELECT(LABELS)
28	=RETURN()

=MID(INDEX(!DATABASE,COUNT,5),DEREF(A12)+2,LEN(
INDEX(!DATABASE,COUNT,5))-(DEREF(A12)+1))&" "&MID(
INDEX(!DATABASE,COUNT,5),1,DEREF(A12)-1)

Figure 2

This macro creates mailing labels in a column of your worksheet. The label lines are built using the lengthy string formulas in lines 13, 17, and 21. (Line 13 is shown in its entirety at the bottom.)

	A
24	**Locator**
25	Interactive database search
26	* Requires that you pre-set criteria
27	=ACTIVATE("DB 1:2")
28	=ALERT("Click cancel if you haven't already set selection criteria",1)
29	=IF(NOT(A28),HALT())
30	=ACTIVATE("DB 1:1")
31	=SELECT("srch_db")
32	=SET.DATABASE()
33	loop
34	=DATA.FIND.NEXT()
35	=INPUT("Locate next match?",2,"Continue Search")
36	=IF(NOT(MID(A35,1,1)="y"),GOTO(Stop))
37	=IF(found,GOTO(loop))
38	No find
39	=ALERT("No additional matches found",2)
40	End loop
41	Stop
42	=DATA.FIND(FALSE)
43	=RETURN()

Figure 3

The database macro that locates matching records. Note the use of the documentation entry in line 26. The Alert instruction (lines 28 and 39) places a message on screen.

	A	B
1	Command	**FixCase**
2		Option-Command-F
3	big	="ABCDEFGHIJKLMNOPQRTSUVWXYZ"
4	small	="abcdefghijklmnopqrstuvwxyz"
5	items	=ROWS(SELECTION())
6	inlabel	=ACTIVE.CELL()
7		=IF(OR(TYPE(inlabel)<>2,inlabel=""),GOTO(skip))
8	outlabel	=UpperLower(inlabel)
9		=FORMULA(outlabel)
10	skip	=SET.VALUE(items,items-1)
11		=SELECT("R[1]C")
12		=IF(items>0,GOTO(inlabel))
13		=RETURN()
14		
15	Function	**UpperLower**
16		=ARGUMENT("string")
17	firstchar	=Upper(string)
18	length	=LEN(string)-1
19	nextchars	=IF(length=0,"",Lower(MID(string,2,length)))
20	concat	=firstchar&nextchars
21		=RETURN(concat)
22		
23	Function	**Upper**
24		=ARGUMENT("upstr")
25	targetup	=MID(upstr,1,1)
26	uppos	=SEARCH(targetup,small)
27	upchar	=IF(ISERROR(uppos),targetup,MID(big,uppos,1))
28		=RETURN(upchar)
29		
30	Function	**Lower**
31		=ARGUMENT("lowstr")
32	chars	=LEN(lowstr)
33		=SET.NAME("lowresult","")
34		=SET.NAME("counter",1)
35	targetlow	=MID(lowstr,counter,1)
36	lowpos	=SEARCH(targetlow,big)
37	lowchar	=IF(ISERROR(lowpos),targetlow,MID(small,lowpos,1))
38		=SET.NAME("lowresult",lowresult&lowchar)
39		=SET.NAME("counter",counter+1)
40		=IF(counter<=chars,GOTO(targetlow))
41		=RETURN(lowresult)

Figure 4

An example of a command macro that executes a number of function macros. FixCase uses the function macro UpperLower. UpperLower uses both Upper and Lower in turn.

	A	B
1		**Overdue**
2		=OPEN("Notice")
3		=PAGE.SETUP(",",0.75,0.75,1,1,FALSE,FALSE)
4		=OPEN("Books")
5		=SELECT("R1C1")
6	firstfind	=DATA.FIND(TRUE)
7		=IF(NOT(firstfind),GOTO(end))
8	title	=ACTIVE.CELL()
9		=SELECT(,"rc[1]")
10	author	=ACTIVE.CELL()
11		=SELECT(,"rc[1]")
12	borrower	=ACTIVE.CELL()
13		=SELECT(,"rc[1]")
14	duedate	=ACTIVE.CELL()+14
15		=SELECT("rc[-3]")
16		=ACTIVATE("Notice")
17		=SELECT(!B4)
18		=FORMULA(borrower)
19		=SELECT(!C12)
20		=FORMULA(title)
21		=SELECT(!C13)
22		=FORMULA(author)
23		=SELECT(!D15)
24		=FORMULA(duedate)
25		=PRINT(1,,,,1,1)
26		=ACTIVATE("Books")
27	nextfind	=DATA.FIND.NEXT()
28		=IF(ACTIVE.CELL()<>title,GOTO(title))
29	end	=RETURN()

Figure 5

A macro that generates library book overdue notices. The labels in the left column indicate instructions to build the various label entries.

OVERDUE NOTICE

To: John Que
From: M. Brooks, Librarian
Date: 1/17/87

This is to remind you that a book you have borrowed from the company library is now overdue. The book is:

Title: Chicago Manual of Style
Author: U. of Chicago Press

This book was due on: 1/14/87

Please stop by the library at your earliest convenience to return or renew this book.

Thank you.

Figure 6

A laser printout of the form letter created by the macro in Figure 5. With a few modifications, the macro can produce letters for any purpose.

Beyond Black and White

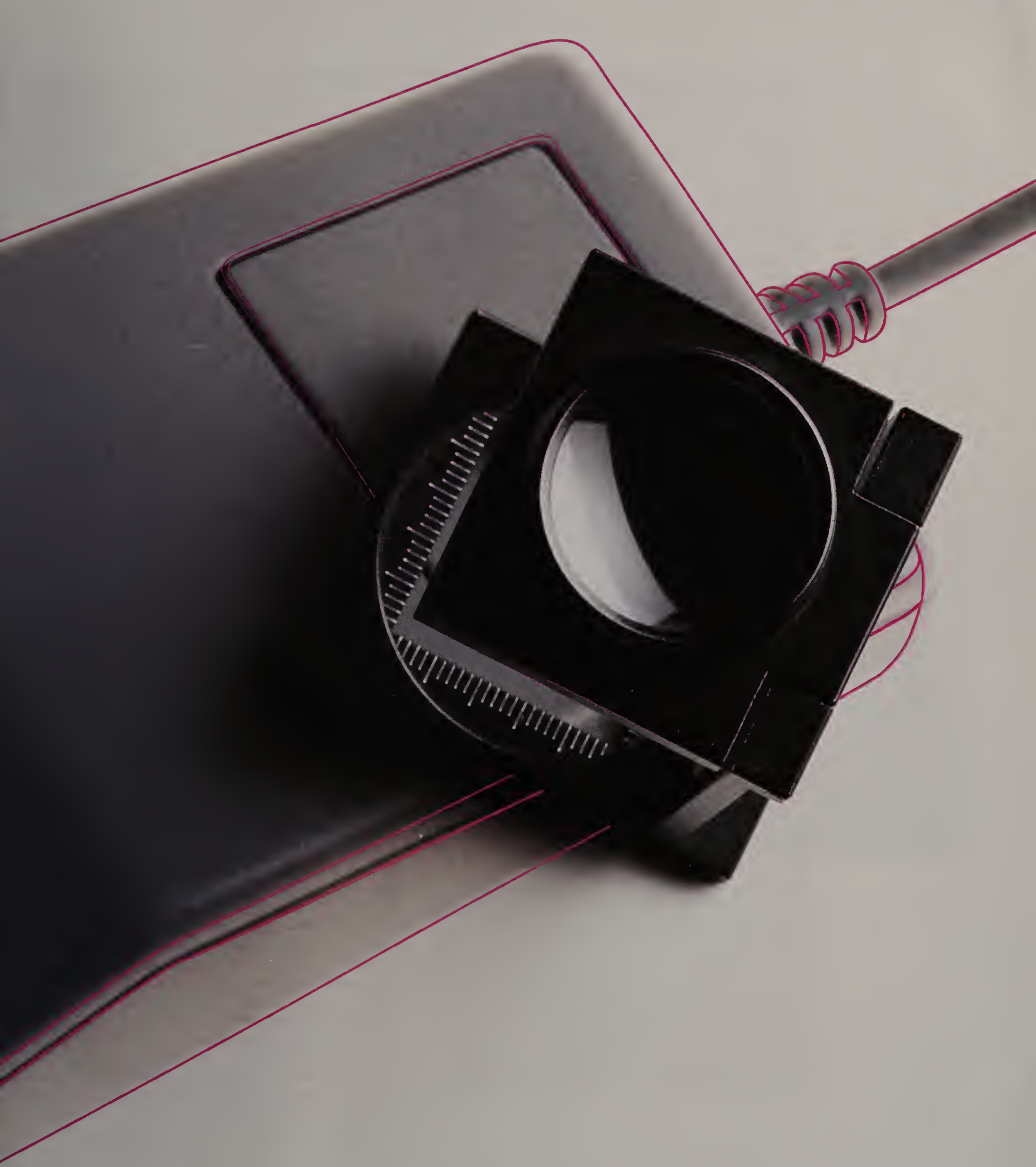
Color publishing without a color Mac—make your own color separations in black and white

by Jim Morton and Michael Mallery

In 1954 the Color Research Institute conducted a startling experiment. A group of consumers were asked to evaluate which of three laundry detergents cleaned their clothes the best. One detergent came in a yellow box, one came in a blue box, and the third came in a box that was predominantly blue with yellow splashes. After trying the detergents, the consumers complained that the yellow brand was too harsh, while the blue left their clothes dirty. Unanimously, they chose the detergent in the blue and yellow box as the one that did the best job. Later they discovered that all the detergents were the same.

We're a long way from 1954, but this color test demonstrates dramatically the effect color has on our perception of things. The clever use of color can sell a product, while its misuse is often disastrous. This is as true in publishing as it is in advertising. A few well-placed touches of color can turn an otherwise drab newsletter into a thing of beauty.

When the first Macintosh page-layout programs appeared, they were limited to single-color layouts, usually black ink on white paper. Because the Macintosh display came in only one model—basic black and white—few software designers bothered to explore the



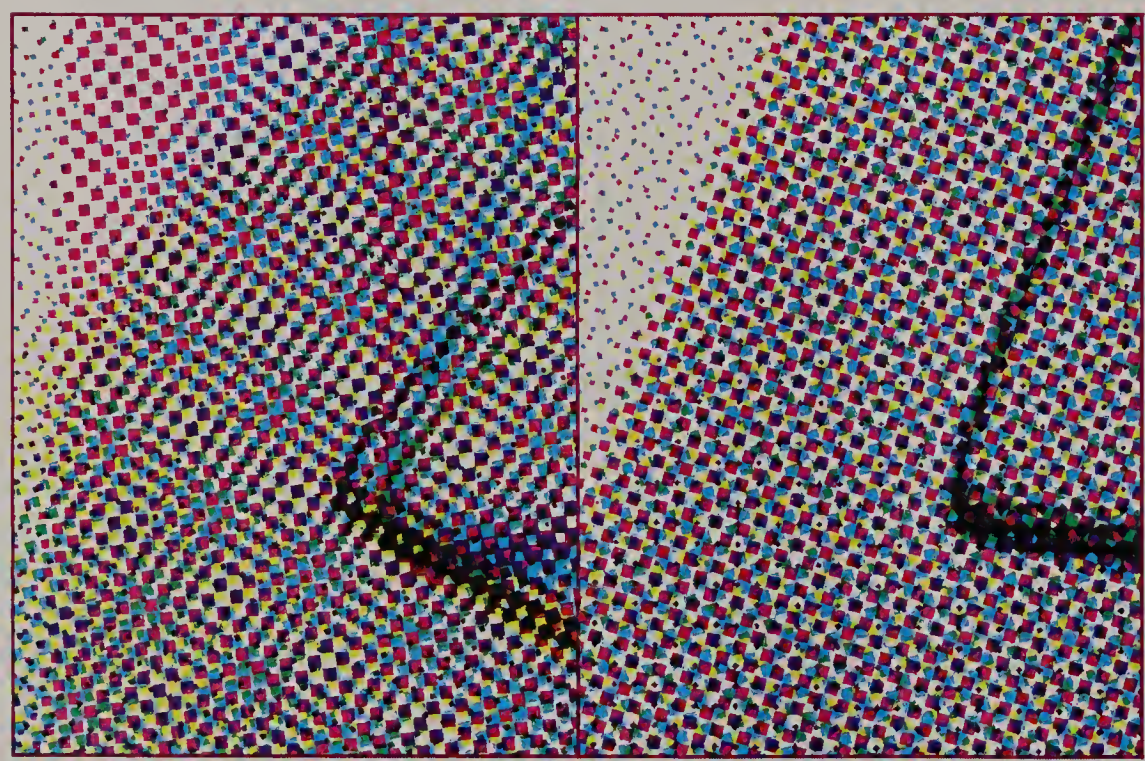
PHOTOGRAPH BY FRED STIMSON

possibilities of color separation on the machine. It wasn't considered an option.

Gradually, patient designers learned to separate their publications into two or more colors by hand, but true color separation just wasn't possible. If you wanted a 30 percent red printed over an 80 percent yellow, you had to explain your design to the printers and let them do the work.

With the introduction of the Mac II, color suddenly became an issue, and programmers started working on ways to create color separations on the Macintosh. Although most of these programs are aimed at the Mac II market, a few imaginative software developers have introduced programs that enable you to create spot-color and four-color separations in black and white. By making your own separations, you eliminate the costly process of photomechanical separation to produce negatives for offset printing. You also gain a little more control over the final product.

Before we go into the specifics of Macintosh color-separation programs, a bit of background on various color processes is in order.



This blown-up detail of the photograph on the previous page shows how process colors add up to produce full-color pictures. Improper angling or assembly of separations can cause moiré patterns like the one at left.

Spot Color

Spot color is the most common type of color in desktop publishing. A newsletter with black type and a green border is an example of spot color. For simple layouts in which the color elements don't abut, there's really no point in making your own spot separations. You simply indicate on a tissue overlay which portions of the publication should appear in color, and the printer does the rest, separating each color by carefully masking different portions of each page on two negatives of the same original.

For more complicated jobs—as, for example, when a colored headline is knocked out of a black background—printers demand that you make your own overlays. The most popular desktop publishing solution to this type of problem involves creating a master page containing all the page elements and then creating two other files, one with all the black items removed and one with all the color items removed. This manual technique is tedious but it works, and until recently it was the only alternative.

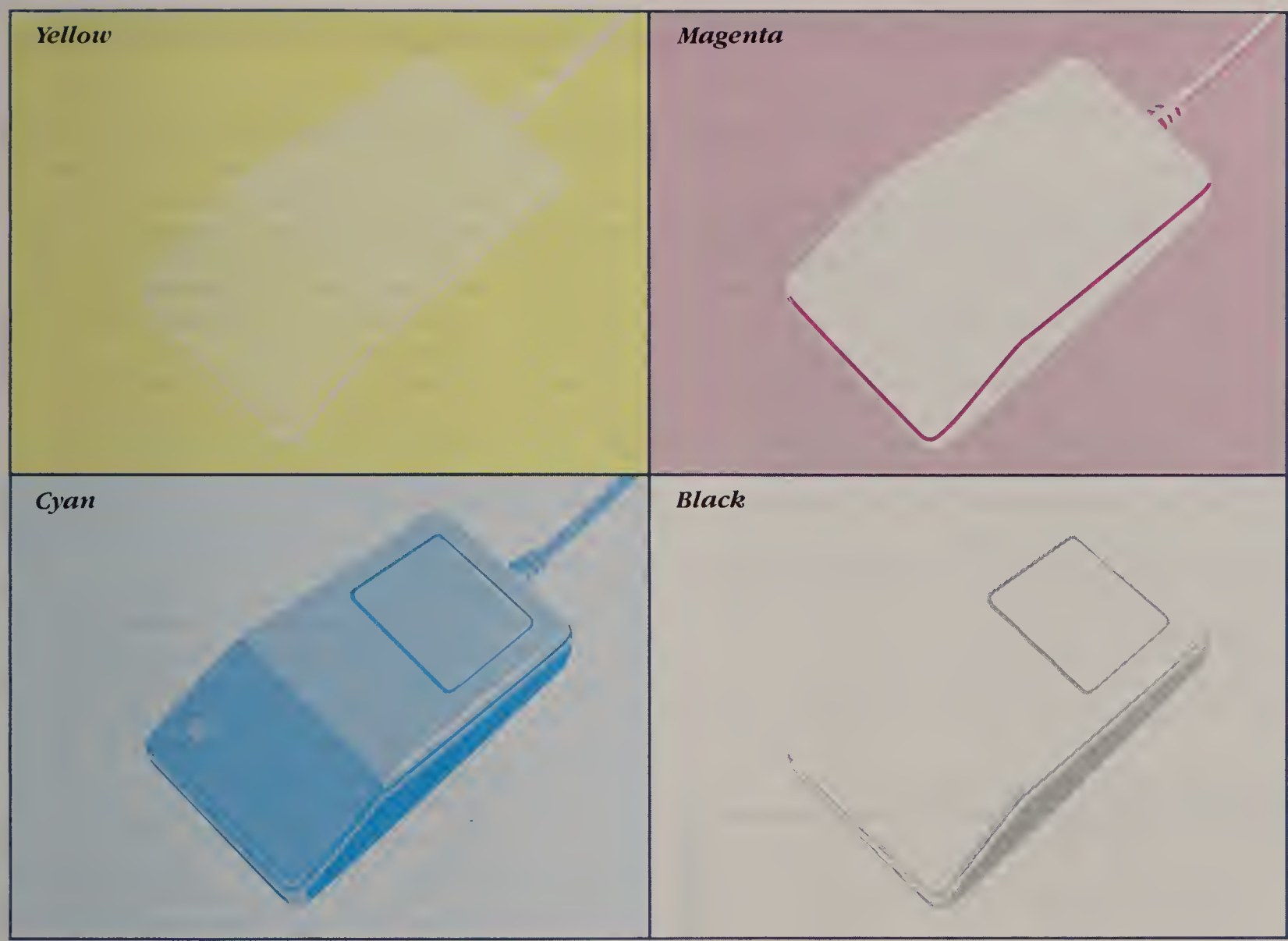
Process Color

Since each color in a spot-color job requires a specially mixed ink and a separate press run, this approach is generally used for projects that require only a few colors. Artists and designers who want a full range of colors generally use a system that enables them to generate virtually any color from only four basic shades.

If you look closely at the illustration at the beginning of this article, you'll notice that it is made up not of solid colors, but of dots. Just as printers use black dots of varying sizes to simulate different gray values, they use dot patterns composed of the four *process colors*—yellow, cyan, magenta, and black—to simulate the full color spectrum. To achieve a desired shade, printers increase or decrease the size of the dots in each of the four process-color halftones; a denser magenta layer tilts the color to the red end of the spectrum, more cyan adds a blue cast (see "Anatomy of an Illustration"). Halftone densities are specified as *screen percentages;* a 100 percent cyan screen would be solid cyan, while a 10 percent screen would be very light in color.

To ensure that the dots constituting the four process-color layers overlay each other in a pleasing way, without creating distracting *moiré* patterns, printers screen the four process-color halftones at precise angles. When the four colors are printed on top of one another, the angled dots combine to form a tight circle called a *rosette.* For four-color work, black would usually be angled at 45 degrees, magenta at 75 degrees, yellow at 90 degrees, and cyan at 105 degrees. In the past, the inability to specify screen angles was one of the things that kept desktop publishers from creating their own color separations.

To determine which combination of process colors will add up to a desired shade, artists and de-



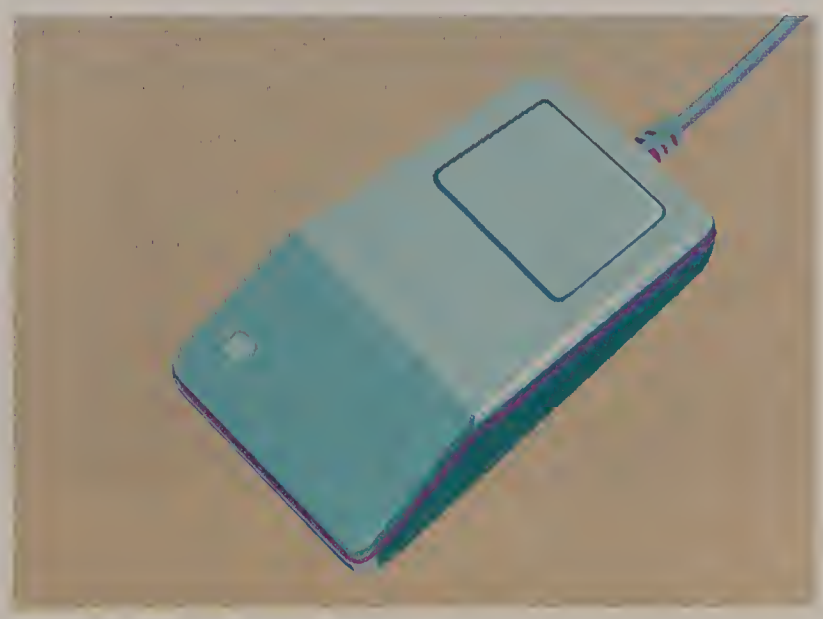
signers use one of three methods. The first employs a device called a color wheel—a round paper disk with four disks of clear acetate fastened to it. Each of the acetate disks is printed with one of the four process colors in screen percentages ranging from 10 percent to 100 percent. By turning the disks you can create almost any color imaginable. The most popular color wheel is the the Murphy Color Guide Wheel, which sells for around $30. Smaller wheels are available for about $10.

The second method of finding colors involves a tint-chart book. Like the color wheel, tint charts contain every possible combination of the four process colors in 10-percent increments—a total of over 14,000 possible colors. To use these charts you simply choose the color you want and then look up the screen values that correspond to that particular color swatch. You can find tint charts in many graphic arts books, or buy them separately. Comprehensive tint-chart books can cost up to $120, but less-inclusive books in the $30 to $40 range are sufficient for most people.

The third method of choosing colors is based on the Pantone Matching System (PMS). The Pantone system, which was designed mostly for spot-color work, uses ink mixtures rather than process-color screen percentages to create colors, but for around $85 you can buy a book that lists the screen percentages required to reproduce the Pantone colors. This system gives you access to some shades you would never

Anatomy of an Illustration

Combining the four process-color layers above yields the full-color illustration shown below. Illustrator *was used to create this image and to specify the color percentages for each part of the mouse. The four separations were printed directly to negative at a 133-line screen ruling using Adobe's* Separator *utility and a Linotronic-100.*



achieve with a color wheel. If you can afford to purchase only one color system, however, you're better off with a color wheel, since the Pantone system provides for only about 500 colors.

XPress

Quark XPress is a powerful page-layout program that incorporates many of the best features of *PageMaker* and *ReadySetGo* 3.0, as well as adding a few features of its own. One of these is the ability to create spot-color separations automatically.

XPress lets you assign one of nine colors to text elements or borders, either during the layout process or after the page is complete. When you click on the Make Separations button in the Print dialog box, the program automatically prints a separate page—complete with trim and center marks—for each color you've included in your scheme. (A clarification: although *XPress* lets you specify color intensity using screen percentages, the program offers no method of angling screens or combining colors. A color placed under another color simply won't print.)

Since spot-color is something many desktop publishers want, including a separating function in a page-layout program is a good idea. Quark's implementation, however, leaves a few things to be desired.

One caveat for publishers who use LaserWriter output is that the active page size for separated *Xpress* files is only 7 by 9½ inches. When you include the automatic registration marks on the page—which most publishers will want to do—the program pushes the page image down and to the right. Any part of the image that falls within 1 inch of the bottom or right-hand edges of the page won't print. (This quirk isn't a problem with Linotronic output, since the printer sheet size is bigger than 9½ by 11.)

Another limitation is that the program gives you only five preselected choices, between 10 and 80 percent, for choosing screen percentages. This is a bit crude: you cannot, for example, specify a 30 percent screen tint, because that's not one of your options.

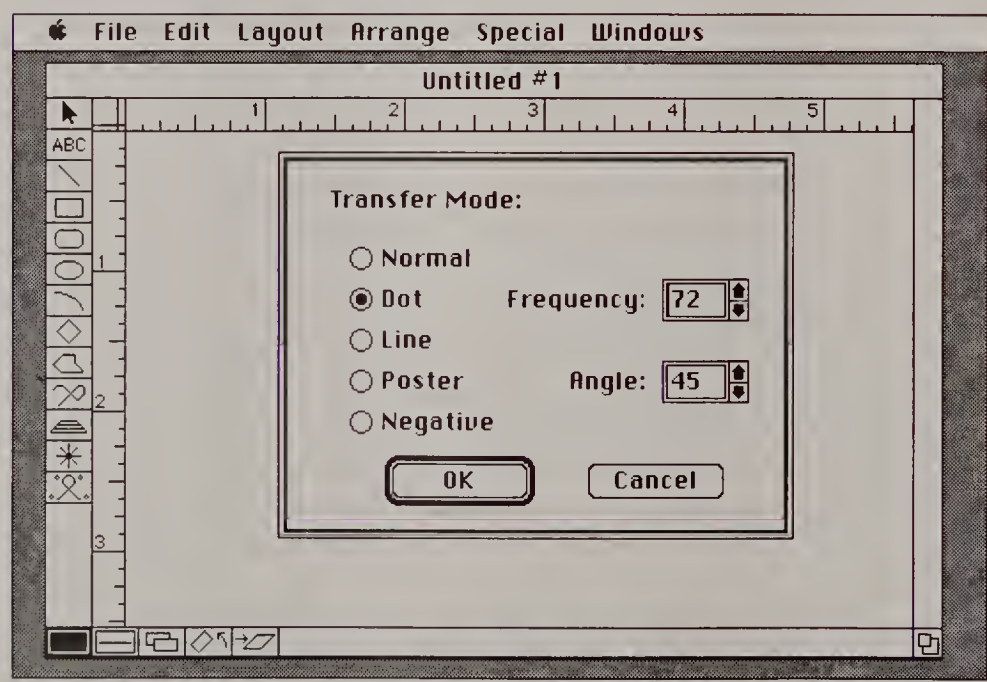


Figure 1
Cricket Draw's *obscure and obscurely named Transfer Mode dialog box provides a clumsy but effective mechanism for setting screen angle and ruling.*

Cricket Draw

The PostScript drawing program *Cricket Draw* was the first Mac package to offer screen-angle commands. Before *Cricket Draw*'s arrival, the only way to change screen angles was via direct PostScript programming. Oddly, Cricket Software neglected to discuss the process for creating specially angled screens in the *Cricket Draw* documentation.

Separating colors with *Cricket Draw* is a slow process, similar to the manual methods Mac artists developed for creating spot color. First you must create a master file that contains all the picture elements, layered from top to bottom as you want them to print (don't forget to include some form of registration marks outside the image area). Close the master file and then open a copy to begin specifying your first process color. You will create a separate file for each color.

Specify the screen percentage of the first color for each object in your drawing by double-clicking on the object and entering the desired percentage in the fill- and line-intensity boxes. If an object doesn't contain any of the color in question, set the fill and line intensities for that object at zero percent. Save the file with an appropriate suffix such as -cyn, -mag, -ylw, or -blk.

Next, to set the screen angle and ruling, select the entire picture and click on the fill-pattern box in the lower-left corner of the screen while holding down the Option key. Doing so calls up the Transfer Mode dialog box (see Figure 1). Clicking on the Dot button presents two new choices: Frequency and Angle. Frequency refers to the number of lines per inch; you can choose any number up to 200 lines per inch (because of the way *Cricket Draw*'s screen-angle algorithm works with the LaserWriter, we got the best results for laser output at the default setting of 72). Set the angle for the cyan, magenta, or yellow file to 105, 75, or 90 degrees, respectively. You don't need to set the angle for the black file, since the program defaults to 45 degrees. Once you've completed one color, repeat the process for the other three.

Notice that the dialog box for selecting fill and line intensity includes a command for color. This com-

A Separator of a Different Color

Comtrex has introduced a package for its Imagizer video digitizer that enables Mac owners to make separations using the same system most print shops do now. The Imagizer system uses a high-resolution black-and-white video camera that connects, via a special interface, to the printer port on the Mac Plus or SE. The color-separation accessory includes software for specifying screen angles and line frequency and a set of color filters. You can mount the Imagizer camera on a copy stand or tripod to make separations of flat work or direct video images.

The programs discussed in this article create what are called *mechanical* color separations. A designer creating mechanical color must choose screen percentages for each shade; if you want an area to print green, you indicate the proper screen percentages on the cyan and yellow overlays. Color photographs are printed using the same four ink colors as are used in mechanical separations, but the technique for creating the separations is quite different. A camera is used, and successive exposures are made using filters that screen out the unwanted colors on each negative. (Although both mechanical and photographic separations use *process colors,* only the photographic separations are referred to as *process color separations.*)

The Imagizer enables you to create true process color separations of anything except reproductions that have already been screened. Once you've made your four exposures, you can readjust the contrast and brightness for any of the negatives at any time, which saves you from having to reshoot in order to readjust your color mix. Since Imagizer files are saved as TIFF documents, they can be manipulated with Letraset's *ImageStudio.* With *ImageStudio,* you can make detail corrections and changes to any size area on each negative—a feat previously available only to print shops using sophisticated scanners and image-assembly stations.

The biggest limitation of the Imagizer system is its inability to handle large reproductions. Comtrex's black-and-white video camera has a resolution of 750 lines per inch—nearly three times the resolution of a standard home video camera. However, the system works by dividing the video image into a constant number of cells. Each cell contains gray-scale information for the tone in that segment of the picture; how that information is used depends on several factors, such as the size of the final reproduction, the number of dots per inch you select for output, and the type of printer being used. A photo that covers an entire page will have only the same amount of information as one that covers a three-inch square, and will look noticeably worse even when both are printed on the same device using the same screen frequency.

In spite of these drawbacks, it is now possible to create four-color process photographs with a Macintosh—an amazing accomplishment that signals a new era in Mac software. Many of the skills and techniques previously available only to people in the printing profession are now available to desktop publishers. Given the speed with which this equipment can create LaserWriter and Linotronic copies, in a few years we may see the Imagizer and systems like it replace the traditional photostat cameras in many print shops and reproduction houses.

We used the Imagizer to capture this still life directly and then printed the separations on paper with a LaserWriter. Negatives were made from the laser copy by conventional means.

Color in Color

The techniques discussed in this article make color publishing possible on a black-and-white Mac, but the natural Macintosh platform for color work of all types will be the Mac II. As this article went to press, two publishers had announced systems that enable Mac II users to actually see their work on screen while making color separations.

VICTORIA FLOYD

The top photo is a standard separation. The bottom one was scanned from a slide, separated on a Mac II with Lithographer, *and printed to negative on a Linotronic.*

In New York, Knowledge Engineering is working on two programs that together turn the Mac II into a color desktop publishing station. *JustText II* is an updated version of Bill Bates's powerful page-composition package. The new color version accepts images from a second program, *Lithographer,* which enables you to capture and edit images from a color scanner.

Lithographer is still command driven, like the original *JustText,* but Bates promises that at least it will be more WYSIWYG. The program has a wide variety of tools for processing images, as well as some color draw and paint capabilities. It's capable of taking densitometer readings into account when printing, allowing a level of control over the final product on a par with expensive image-assembly workstations. Another mark of *Lithographer*'s professionalism is that it prints industry-standard color bars beneath the active page area (these are the color tests printers use to check their ink coverage). The Knowledge Engineering programs can save files in PostScript or EPSF format, but color work must be downloaded using Knowledge Engineering's Document Manager downloading utility.

Pixel-Craft of New York is also preparing a one-two punch for creating color artwork. *Kaleidoscope* is a full-color drawing program that works with the Mac II. It enables you to create shapes and shade them with various tint combinations, displaying the resulting colors on the screen as you work.

Heaven, the second half of the Pixel-Craft system, can create four-color separations from color video images. Unlike the Imagizer System (see "A Separator of a Different Color"), *Heaven* does not require filters or separate shots for each color printer. Instead it interprets the RGB or digital signal from color video monitors and uses that to create the standard process-color separations. *Heaven* saves documents in its own format, but they can easily be converted to PostScript files via a conversion program.

Cricket Software has announced a Mac II version of *Cricket Draw.* It will maintain the *MacDraw*-like interface of the current program and will create color separations for any of 256 predefined colors. (You will not be able to enter percentages to create a color not on the on-screen palette.) The system gives you fewer colors than some other Mac II color separation software, but it does ensure that what you see on the screen closely matches your output. As of this writing no firm release date has been set.

Compared to Scitex and other high-end color image-assembly systems, these Mac II programs are still fairly crude. But they don't cost $700 an hour to operate, either. Considering that they represent only the first generation of Macintosh-based color separation software, they are astounding. It is conceivable that within two years the effect of this technology on the printing industry will be no less dramatic than the effect desktop publishing has had on the typesetting industry.

mand is primarily for use with the ImageWriter II and a color ribbon. It has no effect on color separations, so leave it on Black at all times. You should also be aware that *Cricket Draw*'s screen-angle feature does not work with LaserWriters–only with LaserWriter Pluses.

At press time *Cricket Draw* was just going into beta on a version (1.1) the company says will automate the separation process. That improvement may be available by the time you read this, but as described to us it didn't sound very useful. The beta implementation enables you to use the fill dialog box to specify one of the eight QuickDraw colors for any object in a drawing; when you print, the program calculates the required percentages and makes process-color separations. The program offers no provision for specifying any colors other than the QuickDraw set, however. In our opinion, anyone going to the trouble of printing four-color separations of Mac graphics is going to want more than eight colors. Perhaps Cricket will see the light before final publication.

LaserPaint

LaserPaint's color separation function is far more intelligent than *Cricket Draw*'s. The biggest difference between the two systems is that *LaserPaint* doesn't require you to make four passes through four separate files. Instead, you use a single dialog box to set the percentages of all four process colors for every object in a picture (see Figure 2). If you want to separate for a PMS color, *LaserPaint* makes the process even easier; you simply enter the PMS number of the color you want an object to be, and *LaserPaint* supplies the appropriate screen percentages. The program sets screen angles for you and automatically adjusts the fineness of the screen to the output device you're using, printing with a 72-line screen on a laser printer and a 120-line screen on a Linotronic (if you want to change these settings, you must edit the PostScript code directly).

LaserPaint also gives you an option for working with solid Pantone colors instead of process separations. When you push the Sep Line Color button in the color configuration box, *LaserPaint* prints a separate solid overlay, complete with registration marks, for every PMS color you've chosen.

LaserPaint tries to be as WYSIWYG (what you see is what you get) as possible. For example, it assigns a specific pattern to every color you use, enabling you as far as possible to visualize your color creations in black and white. While this approach has advantages, too much realism isn't always desirable. When you draw with a zero line width in *LaserPaint,* what you see is exactly what you get–nothing. Of course you can draw your picture and then go back through and set all the lines to zero, but with complex shapes it's easy to miss a line or two and not discover your mistakes until after the separations have been printed.

LaserPaint also falls behind the other programs mentioned here in its handling of layers. Unless you use the Mask tool to specifically tell the program that a certain object covers parts of other objects, *LaserPaint* won't remove the hidden lines and fills. All the layers simply print on top of one another.

LaserPaint files can be saved in PostScript, EPSF, and TIFF formats as well as in the program's own proprietary file format. As with *Cricket Draw,* however, no page-layout program can open a separated *LaserPaint* file. The people at LaserWare bill *LaserPaint* as an all-purpose drawing and page-layout program (to prove this claim, they laid out their instruction manual with it), but *LaserPaint* cannot do all the things a true page-layout program should do. For example, it can't open formatted *Word* or *MacWrite* documents–you must completely reformat such documents in *LaserPaint.*

Unlike *Cricket Draw, LaserPaint* does not emulate the *MacDraw* format. People used to working with *Draw*-like graphics programs will find *LaserPaint* difficult to learn. The toolbox has more dials, buttons, and knobs than the cockpit of a Boeing 747, and some procedures work only when they're performed in a specific order. The problem is com-

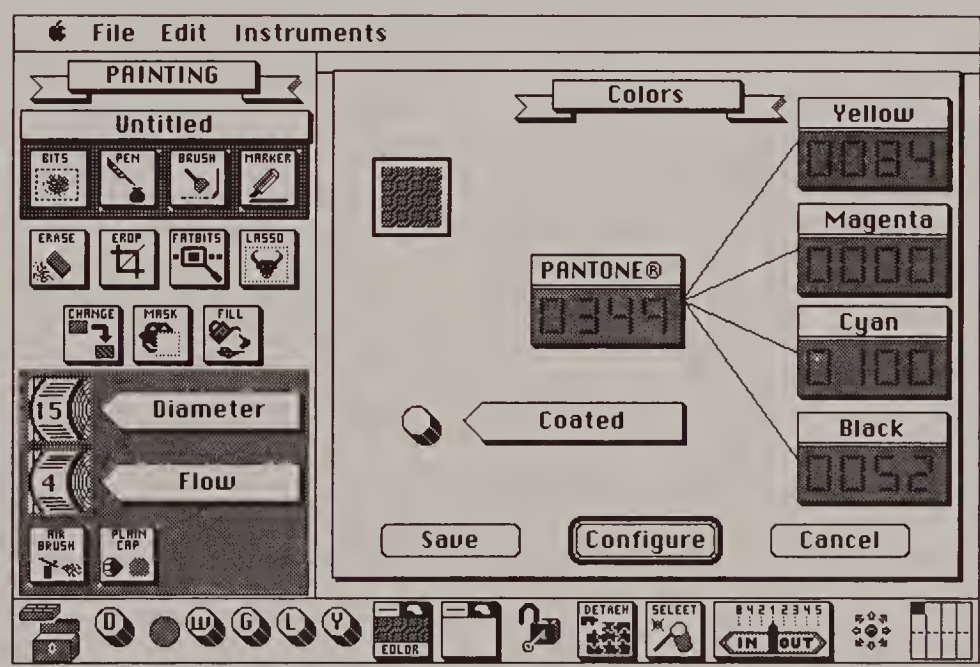


Figure 2

LaserPaint *enables you to create four-color separations either by specifying screen percentages or by simply entering a Pantone number. Those who can put up with this dizzying display can specify up to 48 colors for a single drawing.*

pounded by a manual that's so poorly written that it actually interferes with learning the program.

Nonetheless, *LaserPaint* is currently the only program that supports the Pantone Matching System, making it a good choice for graphic artists who prefer working with PMS colors and who aren't intimidated by the program's long learning curve and complex interface.

Adobe Separator

The best solution to four-color separation on the Mac has come from Adobe. When it designed *Illustrator,* Adobe wisely foresaw the day when some people would want to move past black-and-white graphics. From the beginning, *Illustrator* provided options for specifying four-color screen tints. Adobe's new *Separator* desk accessory simply adds the ability to select screen angles and ruling at print time.

Since *Separator* separates colors based on the PostScript color information encoded into EPSF documents, it should theoretically work with a number of graphics programs. Unfortunately, EPSF is something of a nonstandard standard–especially when it comes

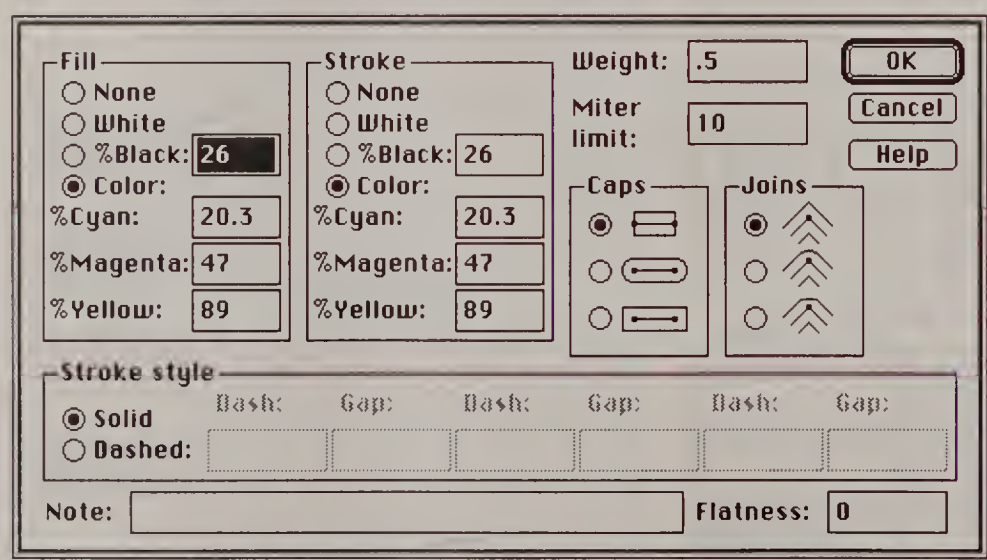


Figure 3
To add a percentage of black to a colored Illustrator *object, double-click inside the percentage rectangle without clicking on the %Black button.* Illustrator *lets you set screen tints to a tenth of a percent, but that degree of control is beyond the abilities of the LaserWriter and should be used only when you're sending files to a Linotronic for output.*

Further Reading

Color separation and the graphic arts in general involve a world of obscure terms and concepts. To help you understand and use these terms, we recommend the following reference books. Each one is both comprehensive and readily available.

Pocket Pal. Pocket Pal Books, International Paper Company, New York, New York. $4.25.

Graphic Designers Production Handbook, by Norman Sanders. Hastings House Publishers, New York, New York. $9.95.

The Graphic Designer's Handbook, New Revised Edition, by Alastair Campbell. Running Press, Philadelphia, Pennsylvania. $14.95, plus $1.00 postage and handling.

GraphicMaster, Third Edition, by Dean Phillip Lem. Dean Lem Associates, Los Angeles, California. $57.50.

Edwards Brothers Graphic Arts Glossary. P.O. Box 1007, Ann Arbor, MI 48106. Free.

The Copy to Press Handbook: Preparing Words and Art for Print, by Judy E. Pickens. John Wiley & Sons, New York, New York. $45.00

The Print Production Handbook, by David Bann. North Light/Writer's Digest Books, Cincinnati, Ohio. $14.95.

to color information. Consequently, *Adobe Separator* can separate files created only from programs that adhere to the Adobe version of EPSF—namely, *Adobe Illustrator* and, to a lesser extent, *PageMaker* 2.0.

If you have experimented with *Illustrator*'s four-color features, you may have noticed that whenever the Color button is selected, the % Black box defaults to zero. Reselecting Black causes the color boxes to turn gray and reset themselves to zero. But many times, a desired color is only possible when you add a touch of black. To get around this problem, select the Color button and set the screen percentages for cyan, magenta, and yellow. Then, without clicking on the Black button, double-click inside the % Black box and set the percentage to the desired amount. Press Return and all four screen percentages will be saved in the document (see Figure 3).

Perhaps the most powerful feature of *Separator* is its ability to combine *Illustrator* and *PageMaker* 2.0 into a full four-color page-layout system. You can now create and color graphics, borders, and display type in *Illustrator,* save them in EPSF, and place them on a page in *PageMaker*. The EPSF drawings retain their color information. All you have to do then is save your *PageMaker* file as an EPSF document, using the EPS button in the Print dialog box, and print your separations using *Separator*.

Separating Dross from Gold

A decision about which graphics or desktop publishing program you use probably won't depend on the program's color separation features alone. You have to look at the total picture. *Quark XPress* makes creating spot-color separations easier, for example, but that feature alone won't justify switching from a page-layout program you're already comfortable with. In some ways, Quark's system is less versatile and less useful than the old manual method.

If you want a good, easy-to-use PostScript drawing program, and you occasionally need to make color separations, *Cricket Draw* is a good choice. The program's color-separating features are cumbersome, but it's a far simpler drawing tool to use than either *LaserPaint* or *Illustrator*. Anyone familiar with *MacDraw* can be up and running with *Cricket Draw* in 15 minutes.

If you intend to make color separations frequently, you'll need more power than *Cricket Draw* can provide. *LaserPaint*'s pattern metaphor and its ability to create PMS shades would make it our first choice if the interface weren't so difficult to master. Only after several tries, many headaches, and a visit to the LaserWare offices were we able to achieve the results we wanted.

The clear winner here is *Separator*—because it works so well with *Illustrator,* which is rapidly becoming the new standard for PostScript graphics, but mostly because it lets you create full-color publications using *PageMaker*. *Separator* also produced the best rosettes and the most accurate screen tints and worked the fastest of the programs we looked at.

All of these programs fall short of being full-featured four-color separation programs. The most serious omission is the lack of a *trap* capability. Whenever two or more colors print next to each other without blending, the lighter color should overlap the other color slightly, so that no gap shows when the two are printed. In all of the programs reviewed here, you can work around the lack of a trap feature by varying the line widths of the lighter-colored objects, but that's a tedious process at best.

The ability to make color separations on the Mac is a major personal-computer breakthrough. The techniques described in this article not only make color separations possible, but they also make separating graphics easier and cheaper than with the old graphic-arts methods, which sometimes required an artist to mask six, eight, ten, or more overlays by hand.

Since this new Mac capability will probably induce more Mac publishers to add color to their work, two caveats are in order. The first is that color is still expensive. Despite savings on separations, you still have to pay for a separate press run for each color. And don't overlook typesetting costs. Outputting four-color halftones on a laser printer works fine for cartoons and small illustrations, but any high-quality, close-registration color work should be printed direct to negative on a Linotronic 300.

The second warning is that while the Mac has made color work easier, you still have to know something about graphic arts and printing to get the results you want. This warning is especially pertinent when you consider the cost of printing color materials. Whether the Mac II programs now beginning to arrive (see "Color in Color") will make Mac color printing more accessible—or merely more sophisticated—remains to be seen. In the meantime, if you have the know-how for color printing—and the budget—and have been saving your money for a Mac II, you can stop waiting. You don't need color to do color. □

At press time Adobe informed us that it was postponing the release of Separator. *We'll keep you posted as we learn of new developments.—Ed.*

See *Where to Buy* for product details.

What's in a Window?

How the Mac II stands up against other workstation windowing environments

PHOTOGRAPHS BY ELISABET ZEILON

by Matt Zeidenberg

The Macintosh II brings Apple into the workstation market: it has a large high-resolution bit-mapped screen, a mouse, and computing power comparable to a DEC VAX minicomputer. Before, we were limited to choosing among workstations from Sun Microsystems, Apollo, or Digital Equipment; today the Mac II offers similar performance and options—but how do these systems compare?

Apple's modified version of UNIX, *A/UX,* codeveloped by Unisoft of Berkeley, California, was announced last March. Although by August it was still nowhere on the horizon, we can assume that Apple will push the product to completion, but perhaps not this year. This delay in *A/UX* availability has produced a sizable gap in Apple's product-line extension into the scientific and engineering marketplace. In recent years, we've seen much effort expended on software development for other UNIX-based workstations: at Carnegie-Mellon (the Andrew project), M.I.T. (Project Athena), Sun Microsystems, and a host of other companies. If Apple is to be competitive within the education and engineering markets, it must produce a version of UNIX comparable to those of other vendors.

As a group, workstations share some system characteristics that the Mac II does not currently support. While the Mac II can connect over a high-speed Ethernet network, it neither allows users to log on to remote workstations on the network nor provides for true multitasking. Furthermore, the Mac II doesn't compare favorably with the workstation mechanisms that allow files to be shared among network users. Theoretically, the Mac II with an EtherTalk card, *AppleShare,* and MultiFinder could claim to have workstation ca-

pabilities. But without the availability of *A/UX*, Mac OS-based Apple products cannot really compare in performance to their workstation counterparts.

Unlike the Mac OS, UNIX provides true concurrency—allowing applications to run simultaneously in separate windows. UNIX also supports a versatile, if arcane, command language.

Concurrent applications can communicate, and do not conflict or corrupt other users' data, since files can be locked or protected. Some UNIX versions support *virtual memory* (a technique for swapping tasks in and out of RAM) so that they appear to have access to virtually unlimited system memory. Finally, there is already an installed base of 80,000 high-performance UNIX-based workstations.

The major complaint about UNIX is its steep learning curve. The windowing systems attempt to remedy this situation by providing a user-friendly "front end." If they do indeed provide an easy-to-learn user environment, UNIX might become a standard operating system for personal computers.

One strong argument for such a case is the C language in which most of the UNIX system is written. Software written in C (or Pascal) for UNIX is relatively portable, especially since most workstations and their software are developed for Motorola's 68020 microprocessor. This has also helped make the UNIX-based workstation market very competitive in price and functionality. To date, Sun Microsystems has the largest installed base of workstations, partly because of its vast library of software and its competitive pricing.

In entering this market, Apple faces two dilemmas. First, it does not have the marketing, sales, technical support, or training programs necessary to gain a significant share of the vast market for low-cost workstations. Second, it must decide whether to support software applications available on other UNIX-based workstations or to make its existing applications compatible with *A/UX*. By making the majority of Toolbox Calls available to applications, Apple is encouraging developers to make their existing applications run under *A/UX*. Whether developers choose to do so remains to be seen. Apple will also seek support from the tradional UNIX software suppliers, a move that would take the company out of its current markets and into unfamiliar territory.

Still remaining, though, is the dissatisfaction of some UNIX users over being forced to use an Apple-dictated window interface, rather than being allowed to develop their own environments. The question of *A/UX*'s compatibility with other window systems is a crucial one. Of the existing windowing systems, the following three are likely to have the greatest influence on UNIX for the Mac II.

The X Window System

The X Window System, developed at M.I.T. partly for the Project Athena computers-in-education program, uses a *client-server* model. The availability of 4.3 Berkeley UNIX source code for X has made it one of the more popular window systems at universities. Tools for use with this system continue to be developed at various sites around the country. Several manufacturers support X; DEC funded much of its development and has released a proprietary version of it. Since much of the code is the property of M.I.T., once UNIX is available on the Mac II, versions of X are likely to be provided at no charge. X is an excellent window system, especially considering the price.

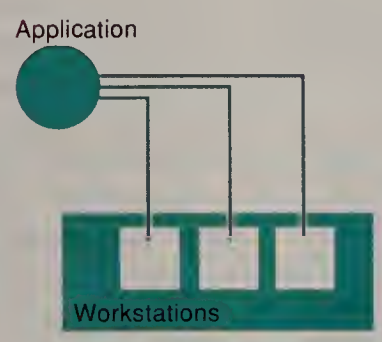
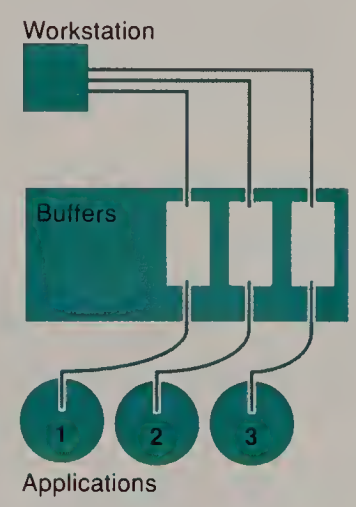
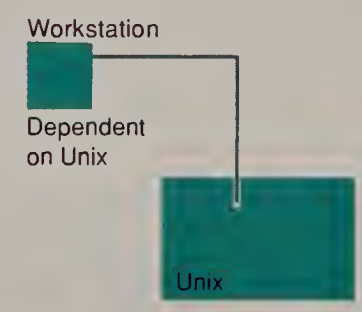
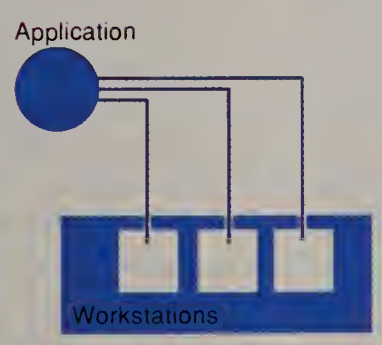
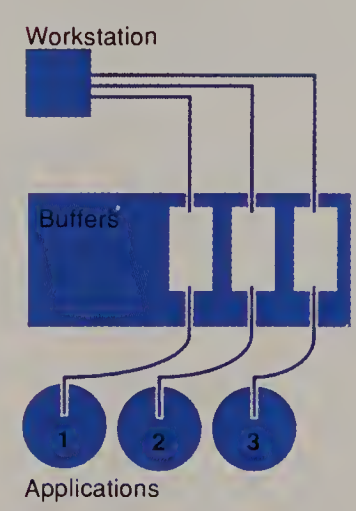
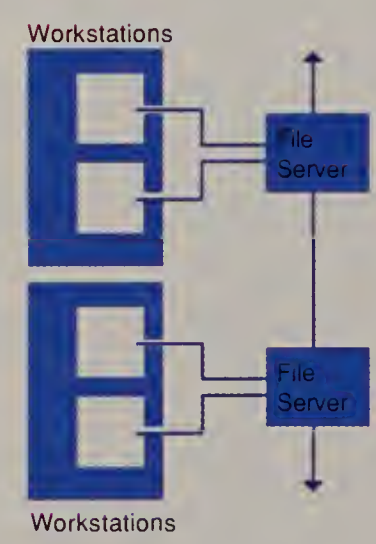
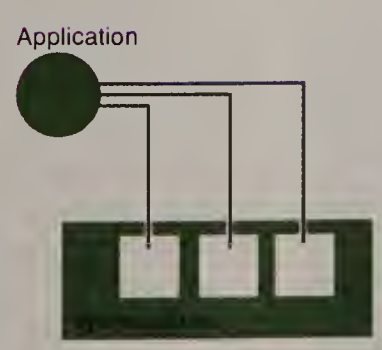
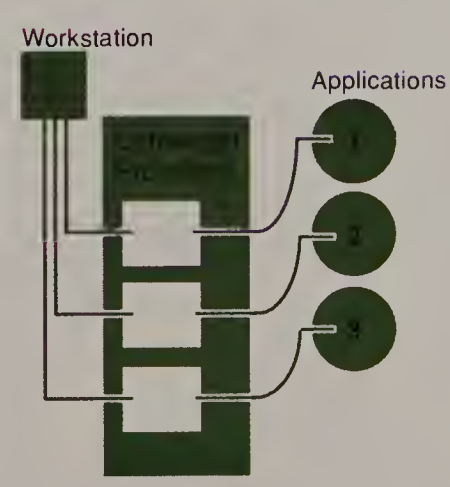
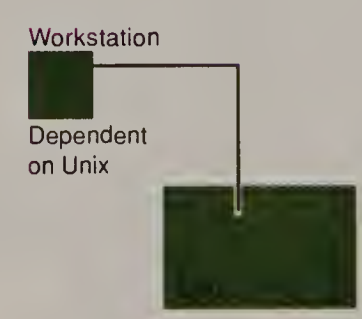
X Windows (X/W) runs as a server process, servicing requests for applications (called *clients*). The application process sends a message to the window system server, asking it to draw the window. This contrasts with the Mac's method of creating graphics in windows. When an application such as *MacPaint* wants to draw a window, it calls a Toolbox procedure in the Macintosh ROM.

The client-server method has several advantages: it works well on a network, enabling an application to run on one machine while sending messages to display windows on another; it lets both client and server processes run concurrently; it allows numerous clients to use a single server, so multiple processes run on a single display; and it permits a single client application to send information to many servers in a network. The server manages windows as separate processes, and it offers users a variety of window managers from which to choose.

X, like the Macintosh, uses resources (windows, fonts, images, and cursors); clients allocate resources by requesting them from the server. X allows resource sharing by granting access to any client that knows the resource's unique identifier. For example, different applications can output to a single window.

X provides for a hierarchy of windows that can, in turn, contain subwindows up to an unlimited level of nesting. The entire screen is called the *root window*. Window nesting allows an individual application, typically contained within a single window, to use all the facilities of X in handling its own subwindows. For instance, one might have on the screen the system clock, an icon representing the file system, and two applications (a word processor and a

Communications Capabilities

	Application to Workstations	Workstation to Applications	File System/Local/ Remote File Access
X			
Andrew			
NeWS			

One application can display information on many workstations. The mechanism that allows multiple applications to run on a workstation is different for NeWS than for X and Andrew. All three systems allow remote access to files via the network.

database) running at the same time–each in its own window on a large screen. The word processor might contain several overlapping subwindows containing individual documents, while the database window might contain several subwindows showing data sorts on different fields.

X allows different commands to be attached to specific keys on the keyboard–the specific attachments are programmable by the user.

Andrew

Developers of the Andrew system saw as their goal the networking of all Carnegie-Mellon student and faculty workstations to enhance campus productivity. Although the project was financed by IBM, initial development was done on VAXs and Sun workstations, since IBM did not then have a workstation of sufficient quality. Now IBM PC and Macintosh versions of Andrew are in the works, and because source code for Andrew has been widely distributed around the country, much additional development is under way.

Designed in conjunction with a network file system, Andrew's window system allows workstations on the network to access files anywhere. Workstations are grouped into clusters, with each one connected as a local area network. The clusters, each with its own file server, are grouped in another local area network. The system also allows for phone line communications.

Andrew's window system is different from most others in its use of tiling, which does not allow windows to overlap on the screen. This speeds window management. If there are too many windows on the screen, they can be reduced or eliminated. Andrew uses pop-up menus, visible anywhere in a window. Since menus lie on top of one another like a fanned-out deck of cards, any of them can be readily selected.

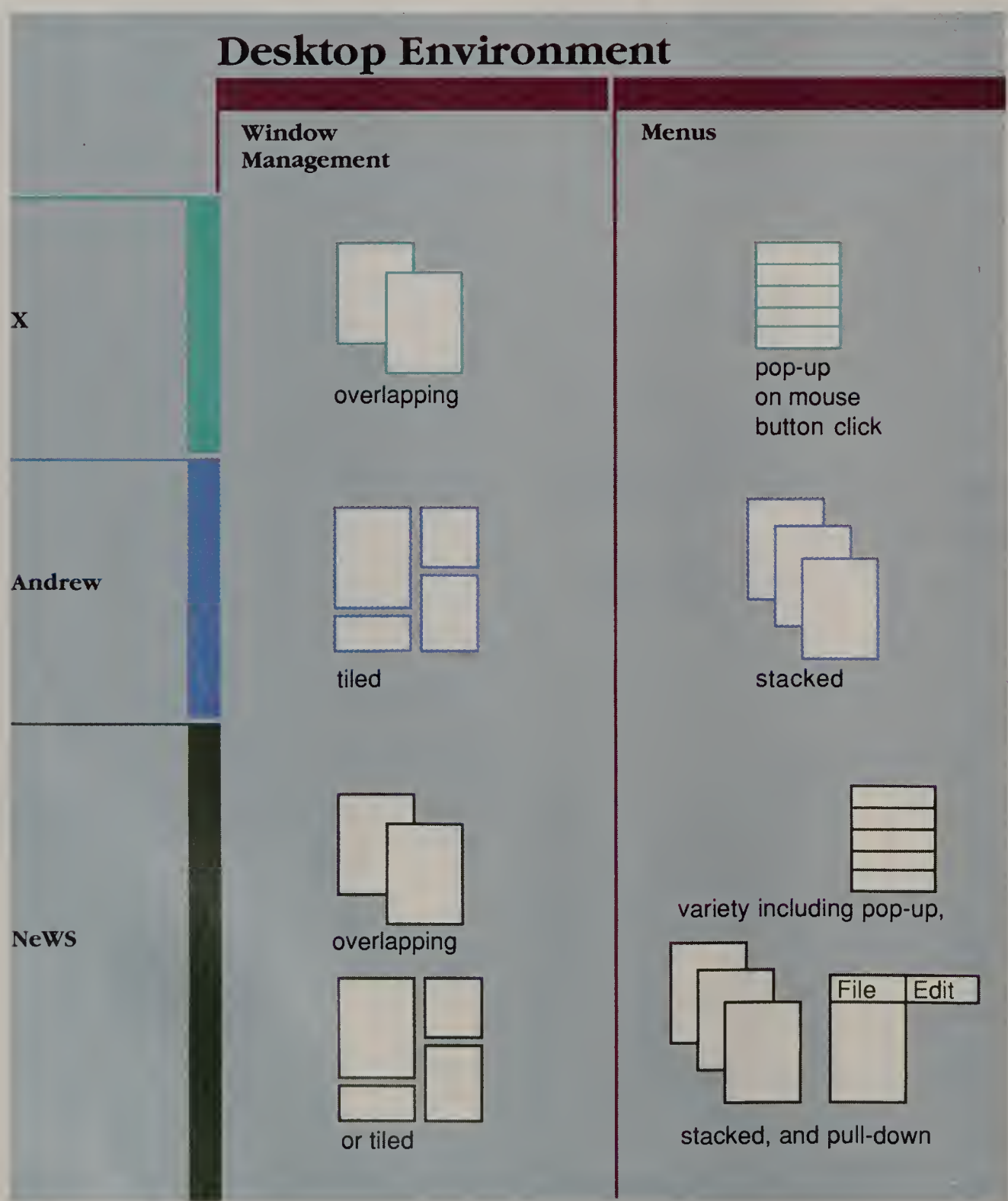
Like X, the Macintosh Toolbox, and NeWS, Andrew supports programming procedures to draw windows, to paint text in various fonts, to draw, and to handle menus and input.

Andrew supports a variety of data types with associated user interfaces, such as buttons, documents, and scroll bars. It also has a built-in database that allows records to be displayed in various ways. You can construct indexes on various fields in the database to produce sorted lists, and the program supports a simple query language. The database makes it relatively easy for applications to integrate large amounts of data.

Of the three window systems described, Andrew has the most application software, including a text editor that sizes text to fit the shape of the window that contains it. In addition, the standard UNIX command interpreter (the shell) has been adapted so that you can use a cut-and-paste editor when typing commands; it also provides a scrollable history of your interactions with the system.

Andrew supports various paint programs, as well as applications that can display files as icons and others that explicitly show the tree structure of UNIX's hierarchical file system (much like the Mac's System). Andrew also has electronic mail and bulletin board utilities.

Much of the development effort at Carnegie-Mellon is going into educational software. Andrew already supports a community of hundreds at the university, a working laboratory for the system. Although most users seem relatively satisfied, some are concerned about Andrew's reportedly slow performance.



The user interface differs for each of the three window systems. The two styles of window management are overlapping and tiled. Menus can be pop-up, stacked, or pull-down.

NeWS

Sun Microsystems describes its NeWS (Network Extensible Window System) as a second-generation window system, in contrast to X and Andrew. *Extensible* describes how the server allows application programs to define their own functions for their own use.

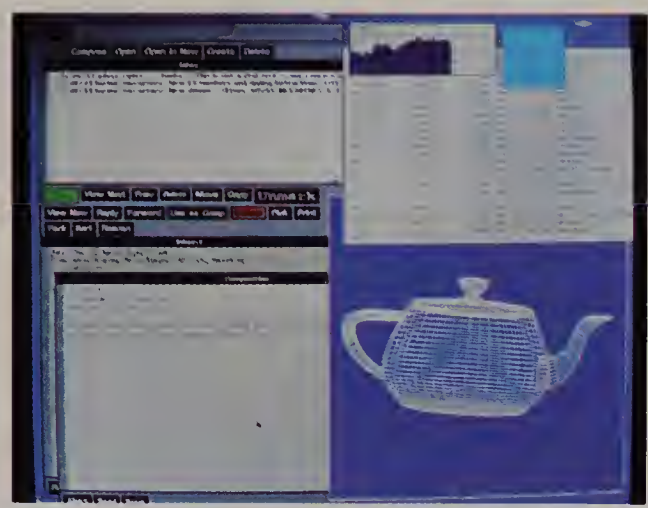
NeWS is programmed in PostScript, which Sun has extended to deal with windowing, and its server runs on workstations. When a client application constructs its user interface, it transmits a PostScript program to NeWS, which interprets it and paints the appropriate image on the screen. The client can also send a PostScript function definition to the server, which is retained in the server's memory for as long as the server remains connected to the client. Since commonly used command sequences need not be repeated, the results are a significant reduction in client/server communications and improved performance.

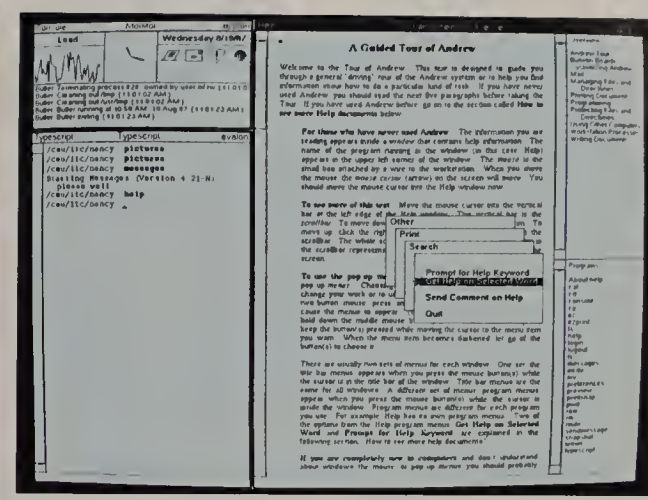
Its extensibility makes NeWS far more customizable than either X or Andrew. By directly programming the server, the client application can reprogram the user interface to resemble X, Andrew, the Macintosh Finder, or any other window system.

A variety of utility functions enables you to program parts of the user interface, such as menu styles and window management techniques. Using applications with different interface styles is not a problem—you can run them concurrently, easily switching back and forth between, say, an application with pull-down menus and one with hierarchical menus. And because NeWS translates display commands for every device it supports, NeWS clients can automatically access the power of any display device without any additional programming.

PostScript allows the NeWS client application to tailor graphics functions to specific needs. For example, it's relatively simple for a checkers-playing program to write a function *drawpiece (i,j)* to draw a checkers piece at the (i,j) square on a previously drawn checkerboard.

Like X and Andrew, NeWS allows a single workstation to run many applications concurrently. NeWS manages this by creating a separate *lightweight* process for each client application to which the server is connected. Lightweight processes are quite efficient to run, since they all share the same address space and require no operating system support. The NeWS server itself contains all the lightweight processes, and hundreds of them can run concurrently without hurting server performance.





The three window systems—X (top left), Andrew (top right), and NeWS—look very similar to the Mac's. Both X and NeWS use overlapping windows, while the Andrew windows are tiled.

NeWS is probably the most advanced of the three window systems discussed here. But it's also the only proprietary one, which is likely to make it more expensive than either X or Andrew.

The Future of Window Systems

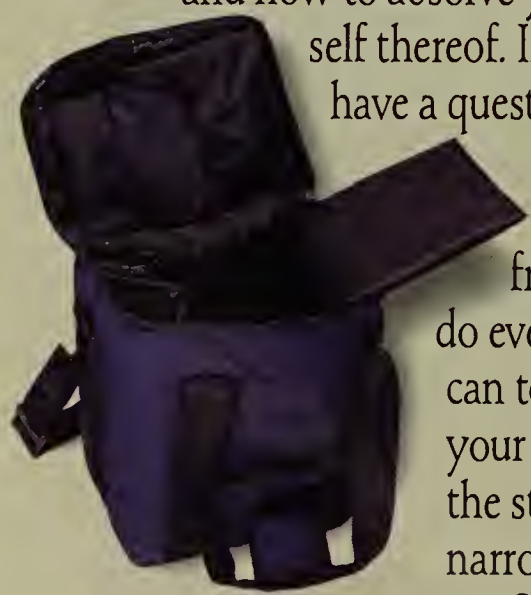
One of the strengths of windowing systems is that they allow users who do a lot of computing to tap the processing time of less heavily used workstations. To do this, one needs an operating system that makes the network seem transparent—as if it were a single computer. LOCUS, built at UCLA, is such a system. Since LOCUS is already being marketed, it's probably just a matter of time before it becomes available for UNIX-based workstations.

It's not clear whether Apple intends to let *A/UX* and UNIX languish while it allows the Mac OS time to develop into a more advanced windowing environment. Nor is it clear whether Apple's engineers and managers believe in sharing resources and processing power across networks. The issue has brought harsh reaction from many, who've said, in effect, "I don't want someone using the unused CPU cycles on my workstation." However, such statements probably reflect an era that has, albeit quietly, already passed. Clearly the Mac II, with only the Mac OS, does provide a cost-effective solution for many workstation needs. That may itself become the future of workstation windowing. □

No Problem.

Here in the pristine village of Marlow, NH (pop. 549) we just don't get to see a whole lot of anger, envy, gluttony, greed, lust, pride, or sloth. But we do have a lot of experience with the seven (or more) deadly computer errors—and how to absolve yourself thereof. If you ever have a question about something you bought from us, we'll do everything we can to get you and your Mac back on the straight and narrow.

Speaking of travelling the straight and narrow, there's no safer way to take your Mac SE on the road than with the **Macinware SE Bag** from I/O Design, Inc.



I/O Design, Inc.
Macinware SE Bag $79

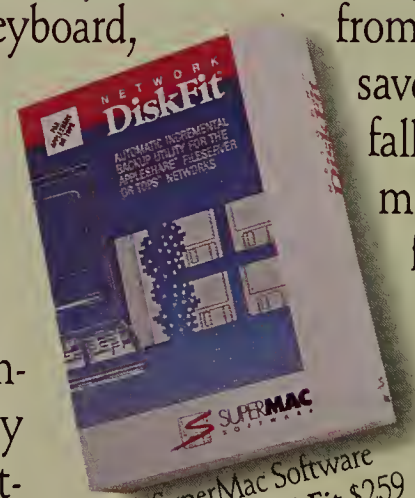
It has padded pockets for your mouse, cords, and keyboard, as well as a special compartment for a disk drive, modem, or accessories. Solid construction and serious padding throughout. Available in navy blue or platinum grey.

Or you can stay home and let your Mac go calling with **MicroPhone** from Software Ventures.

Software Ventures
MicroPhone $119

With this highly-rated communications program you can easily create single commands for complex sequences (e.g.: log on, check mail, print and save messages, log off—all in one stroke). And even direct the program to do the sequence at regular intervals.

The virtuous user always backs up files. **Network DiskFit** from SuperMac Software will save your entire group from falling from grace by automatically backing up (onto floppies, cartridges, or tape) both server and user hard drives. It's fast and efficient—only changed files are recorded during each new backup session.



SuperMac Software
Network DiskFit $259

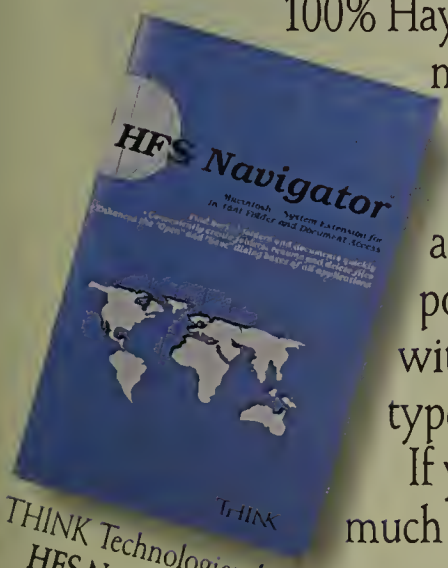
Salvation from disk swapping is yours with the **MacBottom SCSI 21 Meg Hard Disk Drive**

PCPC **MacBottom SCSI 21 Meg Hard Disk Drive** $769

from Personal Computer Peripherals. It comes fully formatted and ready to roll, with software utilities including a print spooler, disk duplicator, and lost file locator. Plus, at only 5 pounds, you can easily take it wherever your computer takes you.

Migent **Pocket Modem** (1200 baud) $169

One of the most innovative (and good looking) products of the year is Migent's 1200 baud **Pocket Modem**. Now, when you travel, and know you'll have access to a computer, you can guarantee you'll have access to a 100% Hayes compatible modem. It works on a 9V battery or AC power and has a serial port to connect with virtually any type of micro.



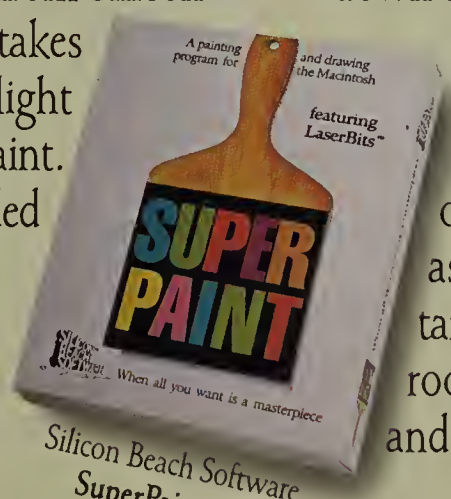
THINK Technologies, Inc. **HFS Navigator** $39

If you spend too much time trying to remember file folder names and then trying to find them, try **HFS Navigator** from THINK Technologies, Inc. It installs in the system file and keeps track of frequently used files. Plus, it helps you search for buried files/folders with just a partial name, and facilitates renaming and deleting.

You can get that abacus, slide rule, and fancy scientific calculator off your desk if you have **MathView** from BrainPower. It's a heavy-duty numerical analysis package that can solve the most extravagant problems including systems of linear and non-linear equations, ODEs, PDEs, optimizations, numerical integrations, and many others. Sophisticated 2D and 3D function plotting, too!

BrainPower **MathView** $149

SuperPaint from Silicon Beach Software takes the Mac several light years past MacPaint. Its vastly-expanded features include multiple windows, automatic scrolling, new shape tools, and "LaserBits," which lets you magnify and work on dots at 300 dpi resolution. You can even print in color on the ImageWriter II.



Silicon Beach Software **SuperPaint** $79

Forethought **FileMaker Plus** $139

FileMaker Plus from Forethought makes it easy to enter your data however you like, and print it however you need. There's even a whole disk full of typical formats, if you don't want to design your own. Calculations, reports, and sorts are a breeze. You can view multiple records screen, combine info from different files, even include graphics in your reports.

So, if you're looking for Mac products at sinfully low prices, combined with the support and service that's certainly down to earth, if not heavenly, call our free-from-toll number. Looking for a specific product? Check our complete list, or just ask one of our sales consultants. We don't always have room to list all our products and new ones arrive every day.

MacConnection™

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Take off

SOFTWARE

NCP denotes not copy-protected.
CP denotes copy-protected.

Aegis Development ... NCP
Doug Clapp's Word Tools . . . . . $42.
Affinity Microsystems ... NCP
Tempo *(power user's macro utility)* . . . . . 55.
Allan Bonadio Associates ... NCP
Expressionist *(equation processor)* . . . . . 52.
ALSoft ... NCP
DiskExpress *(maximize disk performance)* 27.
Altsys ... NCP
FONTastic Plus *(advanced font editor)* . . . . 49.
Fontographer *(LaserWriter font editor)* . . . 245.
Ann Arbor ... NCP
FullPaint *(advanced Paint program)* . . . . . 53.
Batteries Included ... NCP
Thunder! 1.1 *(spelling checker)* . . . . . 32.
Berkeley System Design ... NCP
Stepping Out *(requires 512k)* . . . . . 55.
Blyth ... NCP
Omnis 3 Plus *(multi-user available)*. . . . . call
Bogas Productions ... NCP
Studio Session *(music creation)* . . . . . 59.
Borland International ... NCP
Turbo Pascal Tutor . . . . . 49.
Sidekick 2.0 *(includes MacPlan)* . . . . . 59.
Reflex *(while supplies last)* . . . . . 59.
Turbo Pascal *(HFS compatible)* . . . . . 59.
Reflex Plus *(info management tool)* . . . . . 169.
BPI Systems ... NCP
General Accounting *(full-featured)* . . . . . 129.
BrainPower ... NCP
StatView *(statistics package)* . . . . . 35.
Graphidex *(DA graphics organizer)* . . . . . 69.
Designscope *(electronic circuit design)* . . 129.
MathView *(numerical analysis)* . . . . . 149.
StatView 512+ *(req. external drive, 512k)*. . . 179.
Bravo Technologies ... NCP
MacCalc *(easy to use spreadsheet)* . . . . . 79.
Broderbund ... CP
Print Shop *(create cards and memos)*. . . . . 39.
Geometry *(over 350 problems!)* . . . . . 64.
Videoworks II *(animation tool)* . . . . . 119.
CAMDE ... NCP
Nutricalc Plus *(dietician's delight)*. . . . . 175.
CasadyWare ... NCP
Fluent Fonts *(two-disk set)* . . . . . 29.
Fluent Laser Fonts *(Vols. 1-15)*. . . . . *each* 48.
CE Software ... NCP
Calendar Maker *(create custom calendars)* 27.
Disktop 3.0 *(powerful DA Finder)*. . . . . 35.
Central Point Software ... NCP
Copy II Mac *(includes MacTools)*. . . . . 20.
Centram Systems West ... CP
TOPS *(file-server/LAN software)* . . . . . 125.
Challenger Software ... NCP
Mac3D *(3D graphics, CAD features)* . . . . . 129.
Chang Labs ... NCP
Rags to Riches Ledger or Payables . . . . . 125.
Rags to Riches Receivables *(req. 512k)* . . . 125.
Rags to Riches Three Pak. . . . . 299.
The C.A.T. *(contacts, activities, time)* . . . . . 199.
Inventory Control or Professional Billing . . . 243.
Cortland ... CP
TopDesk 2.3 *(7 new desk accessories)* . . . . 34.
Cricket Software ... NCP
Statworks *(statistical package)*. . . . . 75.

MacConnection Software Special
through November 30, 1987

FORETHOUGHT ... NCP

This month, we are pleased to offer the full line of quality products from Forethought, one of the software leaders in the Macintosh market, and at tremendous savings, too!

Factfinder 1.1 Easy to learn and use. An information organizer that allows free-form entry of data.. . . . . $39.

FileMaker 1.0 Create a variety of custom-designed forms and reports that include text and graphics. Organize customer files, inventory and personnel records.. . . . . 49.

FileMaker Plus 2.0 Powerful database capabilities and flexible forms management. Provides summary reports, calculations and sorting. Includes templates for Rolodex cards, mailing lists, sales forms, etc. . . . 139.

PowerPoint 1.0 Compose and manage materials for business and group presentations. Design and arrange 35mm slides, flipcharts, hand-outs and overhead transparencies. . . . . 189.

Cricket Graph *(multiple windows)*. . . . . 125.
Cricket Draw *(advanced draw capabilities)* 175.
Data Tailor ... NCP
Trapeze *(spreadsheet, reqs. 512k)* . . . . . 159.
DataViz ... NCP
MacLink Plus *(transfer Mac/IBM data)* . . . 159.
Digital, etc. ... NCP
Turbo Maccountant *(GL,AP,AR,Payroll)* . . 259.
Dove Computer ... NCP
RAMSnap *(RAM Disk/Disk Cache)* . . . . . 35.
Dubl-Click Software ... NCP
Calculator Construction Set . . . . . 39.
World-Class Fonts! *(both volumes)* . . . . . 49.
WetPaint Clip Art *(both volumes)* . . . . . 49.
Electronic Arts ... CP
Deluxe Music Construction Set 2.0 . . . . . 63.
Enabling Technologies ... NCP
Easy3D *(create solid 3D objects)* . . . . . 89.
Pro 3D *(3D shaded modeling)* . . . . . 199.
Enzan-Hoshigumi USA ... NCP
Japanese Clip Art Scroll 1 "Heaven" . . . . . 65.
Japanese Clip Art Scroll 2 "Earth". . . . . 65.
MacCalligraphy *(create unique designs)*. . 119.
Firebird Licensees ... NCP
Laser Author *(word processor)* . . . . . 105.
1st Byte ... CP
MAD LIBS *(20 "talking" stories)*. . . . . 14.
Speller Bee or First Shapes . . . . . 32.
KidTalk or Mathtalk . . . . . 32.
SmoothTalker *(speech synthesis)* . . . . . 32.
Forethought ... NCP
Factfinder . . . . . special
FileMaker . . . . . special
FileMaker Plus. . . . . special
PowerPoint . . . . . special
Foundation Publishing ... NCP
Comic People *(create your own characters)* 26.
Comic Strip Factory *(create cartoons)* . . . 59.

FWB Software ... NCP
Hard Disk Backup or Hard Disk Partition $38.
Hard Disk Util *(program backup)* . . . . . 56.
Great Wave Software ... NCP
KidsTime *(educational, ages 3-8)*. . . . . 28.
TimeMasters *(learn about time, ages 4+)* 28.
ConcertWare+ *(music composition)* . . . . . 39.
ConcertWare+ MIDI . . . . . 85.
Greene, Inc. ... NCP
QuickDEX *(address book)* . . . . . 24.
Hayden Software ... CP
MusicWorks *(songs for your Mac)* . . . . . 29.
Score Improvement for the SAT . . . . . 59.
Ideaform ... NCP
MacLabeler or DiskQuick . . . . . 29.
Imagine ... NCP
Smart Alarms *(DA reminder system)* . . . . . 38.
Multi-user Smart Alarms. . . . . 109.
Industrial Computations ... NCP
Powermath *(equation solving tool)* . . . . . 59.
Infosphere ... CP
LaserServe *(network software)*. . . . . 65.
ComServe *(NCP, modem sharer)* . . . . . 129.
MacServe *(network software)* . . . . . 165.
Innovative Data Design ... NCP
MacDraft 1.2A *(requires 512k)* . . . . . 159.
Kensington ... NCP
Type Fonts for Headlines *(req. 512k)*. . . . . 41.
LaserWare ... CP
LaserWorks *(requires 512k, LaserWriter)*. . 199.
LaserPaint *(requires Mac Plus)* . . . . . 319.
Layered ... CP
Notes for...Excel, Microsoft Works, PageMaker, or Word . . . . . *each* 42.
Legisoft/Nolo Press ... NCP
WillWriter 2.0 *(prepare your own will)* . . . . . 31.
Linguist's Software ... NCP
Tech *(1000 different symbols)*. . . . . 59.
Foreign Language Fonts . . . . . call
Living Videotext ... NCP
More *(outlines, windows, & tree charts)* . . 149.
Lundeen & Associates ... NCP
WorksPlus Spell. . . . . 39.
MacroPac International ... NCP
101 Macros for Excel . . . . . 49.
Magnum ... CP
The Slide Show Magician 1.3. . . . . 35.
Micro Analyst ... NCP
Mac Zap *(recover crashed hard disks)* . . . . 36.
Microsoft ... NCP
Flight Simulator *(the Mac takes flight, CP)* 32.
Basic Interpreter 3.0 . . . . . 64.
Chart 1.02 *(42 chart styles, CP)* . . . . . 72.
Multiplan 1.1 *(63 col. by 255 rows, CP)* . . . 111.
File 1.05 *(flexible data manager)* . . . . . 111.
Basic Compiler 1.0. . . . . 119.
Fortran 2.2 *(compiler)* . . . . . 169.
Works 1.0 *(integrated tool)* . . . . . 189.
Excel 1.04 *(power spreadsheet)*. . . . . 224.
Word 3.01 *(word processor)*. . . . . 239.
Miles Computing ... NCP
Mac the Ripper Vol. 3 *(req. Paint program)*. 27.
Orchestra of Fonts Vol. 4 *(30 different fonts)* 27.
Peoples, Places & Things Vol. 5 . . . . . 27.
Mindscape ... NCP
The Perfect Score: SAT *(CP)*. . . . . 47.
ComicWorks *(create your own comics)*. . . . 48.
GraphicWorks 1.1 *(newsletters)* . . . . . 48.
Monogram ... NCP
Dollars & Sense *(home, small business)* . . . 81.

Soft Wear.

Out on a limb.

We don't want to offend anyone, but people who still use hard copy are seriously out of date. Just take a look at the artistic strokes of genius on our temporarily tattooed friend. Why, for the right price, you could present your next newsletter, spreadsheet, or epic poem in real living color.

Picture your logo rippling across someone's exotic exterior. Amaze your boss as the gentle undulations of breath do things to your five-year plan that you never imagined possible. Why, even editing could be fun again!

Fleshtop publishing.

David Chalk and his partner Roy Zuckerman at Temptu Marketing in New York are designing tattoos on their Mac

which are turning traditional marketing literally inside out.

It all started when Roy saw what his father, one of the world's leading cosmetics chemists, had developed for the movie "Tattoo"—a safer and longer-lasting body paint than anything previously available. He and David were soon selling the paint in kits along with design transfers which can be applied in seconds with good old rubbing alcohol.

They've done custom work for everyone from Miami Vice to Guinness Stout. And, for quick designs, the Mac is starting to come in handy (and footy, and everywhere in between). Temptu can now digitize very custom images for transfer to very custom parts.

According to our winners, temporary tattooing is "the contact sport of the 80's." So it's only natural that they've chosen the micro of the 80's to help with their design and marketing. Oh, Lydia, could you have had fun with this one. Eh, Groucho?

Contest Winner #9

Name: David Chalk, Temptu Marketing

System: Mac Plus

Applications: Designs custom temporary tattoos; tracks clients and orders; produces mailing pieces and catalogs.

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with new Macintosh

Odesta ... NCP
Double Helix *(relational, custom menus)* $275.
Multi-User Helix *(requires 512k)* . . . . . 439.
OWL International ... NCP
Guide *(hypertext, free-form info)*. . . . . 79.
Guide Envelope System . . . . . 99.
Palantir ... CP
MathFlash, WordPlay or MacType . . . . . 26.
inTalk *(communication to emulation, NCP)*. 99.
PBI Software ... NCP
HFS Locater *(DA organizer for HFS)*. . . . . 26.
HD Backup *(supports MFS, HFS)* . . . . . 29.
Personal Computer Peripherals ... NCP
HFS Backup . . . . . 32.
ProVUE Development ... NCP
OverVUE 2.0 *(power-packed database)*. . 149.
Rubicon Publishing ... CP
Dinner At Eight-Silver Palate Bundle . . . . . 52.
Satori ... NCP
BulkMailer 3.0 *(mailing lists)*. . . . . 85.
BulkMailer Plus *(up to 90,000 names)* . . . 199.
Legal Billing *(attorneys to accountants)* . . 385.
Legal Billing II *(full trust accounting)*. . . . . 575.
Project Billing *(architects to engineers)*. . . 445.
Silicon Beach Software ... NCP
Silicon Press *(printer utility, 512k)* . . . . . 41.
SuperPaint *(advanced graphics program)* 79.
Simon & Schuster ... NCP
Mac Art Department *(req. Paint program)* 24.
Typing Tutor IV *(new & improved)* . . . . . 35.
SoftStyle ... NCP
Epstart *(Epson printer driver)* . . . . . 27.
Printworks *(print faster & in color)*. . . . . 49.
Laserstart *(Hewlett-Packard Laserjet)*. . . . . 58.
Software Discoveries
Record Holder Plus *(data manager)*. . . . . 45.
Software Ventures ... NCP
Microphone 1.1 *(includes Glue™)*. . . . . 119.
Solutions, Inc. ... NCP
SmartScrap & The Clipper . . . . . 41.
Glue *(creates "print to disk" capability)* . . . 41.
SuperGlue *(total graphic integration)* . . . . . 59.
Springboard ... CP
Art a la Mac Vol. 1 or 2 *(NCP)*. . . . . 23.
Early Games or Easy as ABC. . . . . 28.
Certificate Maker *(requires 512k)* . . . . . 35.
SuperMac Software ... NCP
SuperSpool 3.4 . . . . . 49.
Diskfit *(backup & restore utility)* . . . . . 49.
Network Diskfit *(automatic back up)*. . . . . 259.
SuperLaserSpool . . . . . 99.
Sentinel *(encryption)* . . . . . 99.
Multi-User SuperLaserSpool . . . . . 259.
Survivor Software ... NCP
MacMoney *(financial planner)* . . . . . 42.

Symmetry ... NCP
Acta 2.0 *(outline/writing desk accessory)* $38.
PictureBase 1.2 *(clip art manager, 512k)* . . 59.
Telos Software ... NCP
Business Filevision *(512k, external drive)* 199.
Think Educational ... CP
MacEdge II or Mind Over Mac. . . . . 28.
THINK Technologies ... NCP
HFS Navigator *(search for buried files)*. . . . 39.
Laserspeed *(LaserWriter utility)* . . . . . 59.
Lightspeed Pascal. . . . . 85.
Lightspeed C *(top-rated C Compiler)* . . . . . 99.
InBox Starter Kit *(CP)*. . . . . 225.
InBox Personal Connection *(Mac & PC)*. . . call
T/Maker ... NCP
ClickArt Personal Graphics, Effects,
Publications, Letters Vol. 1 or 2, Holidays,
Business Image . . . . . *each* 28.
Bombay, Plymouth, or Seville Laser font . . . 46.
Write Now *(word processor)* . . . . . 99.
TML Systems ... NCP
TML Source Code Library . . . . . 58.
TML Pascal *(compiler, req. 512k)*. . . . . 68.
TrueBasic ... NCP
True BASIC *(fast, flexible, & portable)*. . . . . 59.
Algebra I or II, Pre-calculus, Trigonometry,
3D Graphics, Discrete Math, Probability,
Calculus, Arithmetic, & MacFunction. . *each* 35.
TrueSTAT *(statistics)*. . . . . 58.
Runtime *(create stand-alone applications)* . . 59.
Unicorn ... CP
Animal Kingdom *(ages 6-12)*. . . . . 27.
Decimal Dungeon *(math, ages 9 and up)* . . 27.
Fraction Action *(arcade style math game)* . . 27.
Mac Robots *(pre-school program)*. . . . . 27.
Math Wizard *(math games, ages 5-10)*. . . . . 27.
Read-A-Rama *(reading, ages 5-8)*. . . . . 32.
William & Macias ... NCP
myDiskLabeler *(design & print labels)* . . . . . 24.
myDiskLabeler w/Color *(req. Imagewriter II)* 33.
myDiskLabeler w/LaserWriter option . . . . . 38.
Working Software ... NCP
Findswell *(locate documents fast)* . . . . . 32.
Spellswell *(spelling checker)* . . . . . 42.
Spellswell Medical Dictionary. . . . . 59.

GAMES

Accolade ... CP
Hardball *(baseball simulation)* . . . . . 24.
Activision ... CP
Tass Times in Tonetown . . . . . 21.
Championship Star League Baseball. . . . . 22.
Shanghai *(Mah Jongg strategy)*. . . . . 24.
Portal *(sci-fi novel)* . . . . . 30.

Addison-Wesley ... CP
Puppy Love *(your dog will love it!)*. . . . . $19.
Artworx ... CP
Bridge 5.0 *(sharpen your skills)* . . . . . 22.
Avalon Hill ... CP
MacPro Football *(req. 512k)*. . . . . 30.
MacPro Football 85 Team or Season . . . . . 16.
Blue Chip ... CP
Millionaire, Tycoon, Baron or Squire. . . . . 35.
Broderbund Software ... CP
Lode Runner *(over 150 levels)* . . . . . 24.
Ultima III *(fantasy adventure)* . . . . . 24.
Ancient Art of War *(military strategy)*. . . . . 27.
Maze Wars + *(play via modem or network)* 32.
Toy Shop *(create working models)* . . . . . 39.
Bullseye ... CP
Ferrari Grand Prix *(Formula One racing)*. . . 34.
Fokker TriPlane Flight Simulator . . . . . 34.
Electronic Arts ... CP
Ogre *(tank simulation)* . . . . . 20.
Archon *(arcade strategy, req. 512k)* . . . . . 27.
Skyfox *(3D graphics)* . . . . . 27.
Seven Cities of Gold. . . . . 27.
One on One/Dr J vs Larry Bird *(req. 512k)*. . 27.
Patton-vs-Rommel *(req. 512k)* . . . . . 27.
Pinball Construction Set. . . . . 27.
Chessmaster 2000 . . . . . 30.
Epyx ... CP
Rogue *(strategy dungeon classic!)*. . . . . 15.
Sub Battle Simulator . . . . . 24.
Winter Games *(Olympic events)* . . . . . 24.
Hayden Software ... CP
Sargon III *(9 levels of chess)*. . . . . 29.
Infinity Software ... CP
Go *(4000-year-old strategy game)* . . . . . 23.
Grand Slam *(tennis, req. 512k)*. . . . . 27.
Infocom ... CP
Hitchhiker's Guide to the Galaxy . . . . . 18.
Leather Goddesses, Trinity, Moonmist,
Ballyhoo, Bureaucracy, Stationfall
Hollywood Hyjinx *(standard)* . . . . . *each* 24.
Zork Trilogy . . . . . 45.
Invisiclues Hint Booklets *(please specify)* . . . 6.
Miles Computing ... CP
Harrier Strike Mission *(3D flight simulation)* 27.
Quintette *(strategy of "Go")*. . . . . 27.
Down Hill Racer *(3D ski simulation)* . . . . . 27.
Fool's Errand *(solve the puzzles)* . . . . . 27.
Mindscape ... NCP
Balance of Power *(world politics)* . . . . . 30.
King of Chicago *(req. minimum 512E)* . . . . 30.
Shadowgate *(castle adventure)* . . . . . 30.
Uninvited or Deja Vu . . . . . 30.
PBI Software ... CP
Strategic Conquest *(multi-user)* . . . . . 35.

1-800/Mac&Lisa 760C

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MEMBER

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All items subject to availability. Prices subject to change without notice.

*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion. Some items have warranties up to five years.

products.

Primera Software ... CP
Smash Hit Racquetball *(top-rated!)* . . . . . $15.
Psion ... CP
Psion Chess *(3D and multi-lingual)* . . . . . 31.
Sierra On-Line ... CP
King's Quest or King's Quest II . . . . . 30.
Space Quest . . . . . 30.
Silicon Beach Software
Airborne! *(CP, the classic!)* . . . . . 20.
Enchanted Scepters *(CP, over 200 scenes)* 21.
Dark Castle *(NCP, arcade action)* . . . . . 28.
World Builder *(NCP, program creator)* . . . . . 41.
Simon & Schuster ... CP
Star Trek—The Kobayashi Adventure . . . . . 24.
Sir-Tech ... CP
Mac Wizardry *(high-rated fantasy)* . . . . . 35.
SPHERE, Inc. ... NCP
Tellstar II *(No. & So. hemispheres, req. 512k)* 15.
GATO or Orbiter . . . . . 26.
XOR ... NCP
NFL Challenge *(be the coach!)* . . . . . 69.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

NOTE: Some hardware items are available in either platinum or beige color. Please specify.

20 Megabyte SCSI Hard Drive . . . . . 569.
Apricorn ... 1 year
ApriCord Mac *(for Mac 512k or Mac Plus)* 75.
AST Research ... 6 months
AST TurboScan *(300 dpi scanner)* . . . . . 1395.
AST 2000 *(20 Meg, 20 Meg tape)* . . . . . 1395.
AST 4000 *(74 Meg, 60 Meg tape)* . . . . . 3695.
Curtis Manufacturing ... lifetime
Diamond *(6 outlets)* . . . . . 29.
Emerald *(6 outlets; 6 ft cord)* . . . . . 36.
Sapphire *(3 outlets; EMI/RFI filtered)* . . . . . 47.
Ruby *(6 outlets; EMI/RFI filtered; 6 ft cord)* 55.
Dove Computer ... 90 days
High quality memory upgrades.
MacSnap 524 *(512k to 1 Meg)* . . . . . 139.
MacSnap 548 *(512k to 2 Meg)* . . . . . 369.
MacSnap 2S *(1 Meg to 2.5 Meg)* . . . . . 649.
MacSnap 4S *(1 Meg to 4 Meg)* . . . . . 1299.
Ergotron ... 1 year
Mouse Cleaner 360° . . . . . 15.
MacTilt or MacTilt SE . . . . . 74.
MacTilt *(for large monitor)* . . . . . 95.
MacBuffer 512k . . . . . 329.
MacBuffer 1024k . . . . . 429.
Farallon Computing ... 1 year
PhoneNET PLUS *(DB-9 or DIN-8)* . . . . . 39.
Hayes ... 2 years
Smartcom II *(communications software)* . . 88.
Smartmodem 1200 . . . . . 299.
Smartmodem 2400 . . . . . 449.
IOMEGA ... 1 year
Bernoulli Box *(dual 20 Meg w/SCSI)* . . . 1879.
Kensington ... 1 year
Appletalk Cable Clips or Connectors . . each 1.
Mouseway *(mouse tracking pad)* . . . . . 8.
Mouse Pocket *(for your idle mouse)* . . . . . 8.
Mac Plus/Mac SE System Saver Cover . . . . 9.
Imagewriter II Dust Cover . . . . . 9.

MacConnection Hardware Special
through November 30, 1987

PERSONAL COMPUTER PERIPHERALS

The PCPC MacBottom drives are proven winners for quality, speed and reliability. And now your cost is even lower! All drive units come complete with cables, documentation, Imagewriter and LaserWriter print spooling, HFS Backup, and locator software. Additional features include:

- All new 2-year warranty
- Quiet & lightweight, fits under Mac
- Optional built-in 1200 bps modem available for each drive

MacBottom HD 21 Meg SCSI . . . . . $749.
MacBottom HD 32 Meg SCSI . . . . . 959.
MacBottom HD 45 Meg SCSI . . . . . 1199.

Mouse Cleaning Kit w/Mouse Pocket . . . . . 17.
Disk Case *(holds 36 Mac disks)* . . . . . 19.
Disk Drive Cleaning Kit . . . . . 20.
Tilt/Swivel . . . . . 22.
Universal Copy Stand . . . . . 24.
Polarizing Filter *(Mac Plus or Mac SE)* . . . . 34.
Surge Suppressor . . . . . 34.
Printer Muffler *(80 column)* . . . . . 39.
Printer Muffler *(132 column)* . . . . . 52.
Control Center . . . . . 64.
System Saver Mac . . . . . 64.
A-B Box *(for the Mac Plus)* . . . . . 64.
Turbo Mouse *(for the MacPlus & SE)* . . . . . 85.
Koala Technologies ... 90 days
MacVision *(digitizer, includes MoreVision)* 175.
Kraft ... 1 year
3 Button QuickStick . . . . . 39.
Migent ... 1 year
Pocket Modem *(ext. 300/1200 baud)* . . . . 169.
Mirror Technologies ... 1 year
Magnum 800 External Drive . . . . . 209.
Magnum Tape 20 Backup . . . . . call
Magnum Tape 40 Backup . . . . . call
MagNet 40/40 *(40 Meg, 40 Meg tape)* . . . . call
MagNet 30x *(w/cable & print spoolers)* . . . call
MagNet 40x *(w/cable & print spoolers)* . . . call
Nutmeg Systems ... 1 year
Nutmeg FPD 15" Monitor . . . . . 1495.
Nutmeg 19" Monitor . . . . . 1579.
Nuvotech ... 1 year
EasyNet *(AppleTalk network connector)* . . . 29.
Personal Computer Peripherals ... 2 years
Optional built-in 1200 bps modems available.
MacBottom HD 21 Meg *(SCSI)* . . . . . special
MacBottom HD 32 Meg *(SCSI)* . . . . . special
MacBottom HD 45 Meg *(SCSI)* . . . . . special
SoftStyle ... 90 days
MacEnhancer *(for plotters to printers)* . . . . 179.
Summagraphics ... 90 days
MacTablet 12" x 12" . . . . . 379.
Systems Control ... 2 years
MacGard *(surge protection)* . . . . . 55.
Thunderware ... 90 days
ThunderScan 4.0 with PowerPort . . . . . 199.
Western Automation ... 1 year
DASCH RAMdisk 2000k . . . . . 399.

DISKS

Sony 3½" DS/DD Disks *(box of 10)* . . . . . $19.
MAXELL 3½" DS/DD Disks *(box of 10)* . . . 20.
Fuji 3½" DS/DD Disks *(box of 10)* . . . . . 20.
Verbatim 3½" DS/DD Disks *(box of 10)* . . . 20.
3M 3½" DS/DD Disks *(box of 10)* . . . . . 21.

INFORMATION SERVICES

CompuServe Information Service . . . . . 24.
Dow Jones News/Retrieval Membership Kit 24.

ACCESSORIES

Clean Image Ribbon Co.
Clean Image Ribbon Kit . . . . . 12.
Computer Coverup
Imagewriter II Cover . . . . . 8.
Mac Plus & Keyboard *(two covers)* . . . . . 10.
I/O Design
Imageware II *(Imagewriter II carry case)* . . . . 49.
Macinware Plus *(Mac Plus carry case)* . . . . . 69.
Macinware SE *(Mac SE carry case)* . . . . . 79.
Kalmar Designs
Teakwood Roll-top Case *(holds 45 disks)* . . . 14.
Teakwood Roll-top Case *(holds 90 disks)* . . . 21.
Teakwood Roll-top Case *(holds 135 disks)* . . 29.
Magnum
Mouse Mover *(let your mouse ride!)* . . . . . 14.
Moustrak
Moustrak Pad *(standard 7" x 9")* . . . . . 8.
Moustrak Pad *(large 9" x 11")* . . . . . 9.
Sensible Softworks
Quality "MacAttire" nylon dust covers . . . . 7-17.
High Trek Imagewriter II carry case . . . . . 49.
High Trek Mac Plus or SE carry case . . . . . call

OUR POLICY

- We accept VISA and MASTERCARD.
- No surcharge added for credit card orders.
- Your card is not charged until we ship.
- If we must ship a partial order, we never charge freight on the shipment(s) that complete the order.
- No sales tax.
- All U.S. shipments insured; no additional charge.
- APO/FPO orders usually shipped 1st Class Mail.
- Allow 1 week for personal and company checks to clear.
- UPS Next-Day-Air available.
- COD max. $1000. Cash or certified check.
- 120 day limited warranty on all products.*
- To order, call us anytime Monday thru Friday 9:00 to 9:00, or Saturday 9:00 to 5:30. You can call our business offices at 603/446-7711 Monday through Friday 9:00 to 5:30.

SHIPPING

Note: Accounts on net terms pay actual shipping. **Continental US:** Barring massive computer failures and other natural or unnatural catastrophes, all orders phoned into MacConnection by 8 PM EST will ship Airborne the same night for next day delivery, except for those within UPS Ground Zone 1 (which is also an overnight service). The total freight charge on any order placed with MacConnection is now $3. Backorders will also ship Airborne overnight at no additional charge. Airborne assesses an additional $7 charge for C.O.D. **Hawaii:** Shipments may incur an additional day. **Alaska and Outside Continental US:** Call 603/446-7711 for information.

Reviews

Four of a Kind

HyperDrive FX/40

SCSI hard disk. ***Pros:*** *Includes very good software.* ***Cons:*** *Bulky case; technical support available only from dealers.* ***List price:*** *$1799.* ***Requires:*** *512KE.*

Jasmine Direct Drive 50

SCSI hard disk. ***Pros:*** *Low price; good technical support; includes 9MB of shareware and public domain software; good manual.* ***Cons:*** *Units frequently back-ordered; weak backup software.* ***List price:*** *$1159.* ***Requires:*** *512KE.*

MacBottom HD45

SCSI hard disk. ***Pros:*** *Lightweight, sleek design; quiet; automatic head-parking.* ***Cons:*** *Expensive; hard-to-reach on/off switch.* ***List price:*** *$1795; modem $200.* ***Requires:*** *512KE.*

Rodime 45 Plus

SCSI hard disk. ***Pros:*** *High-quality performance; surge protection.* ***Cons:*** *Bulky case; weak manual; minimal technical support.* ***List price:*** *$1595.* ***Requires:*** *512KE.*

Forties are replacing twenties as the standard SCSI hard disk. The increase in capacity has not been reflected in cost; the list prices compare favorably to those of 20MB drives just a year ago. All four hard disks evaluated here are comparable in speed and performance, differing only in bundled software, detailing, price, and technical support. All will work with a 512KE, a Mac Plus, or an SE, and by now, probably with the Mac II (although a slightly different formatter is required). For testing purposes, the four drives were reformatted, then loaded with identical systems and files, and used for several days under normal working conditions.

HyperDrive FX/40

General Computer's new external hard disk has a separate rather than a built-in terminator, which makes the drive slightly inconvenient to use (except for those who plan to daisy-chain more than two SCSI devices). It also lacks a light to indicate when it's on or being accessed. It's packaged in a mod plastic case, but the molded handle does not provide an adequate grip. I also found this unit to be the loudest of the four.

The software General Computer included with the FX/40 is the best of the lot. *FX Manager* 3.0 lets you change the SCSI address, park the heads, test the disk, and initialize it. The advanced backup utility allows you to back up to other hard disks as well as to floppies. The software package also includes a password utility and print spoolers for the ImageWriter and the Laser-Writer. Although the two manuals (one for disk use and installation, the other for the software) are thin, they are well indexed and adequate.

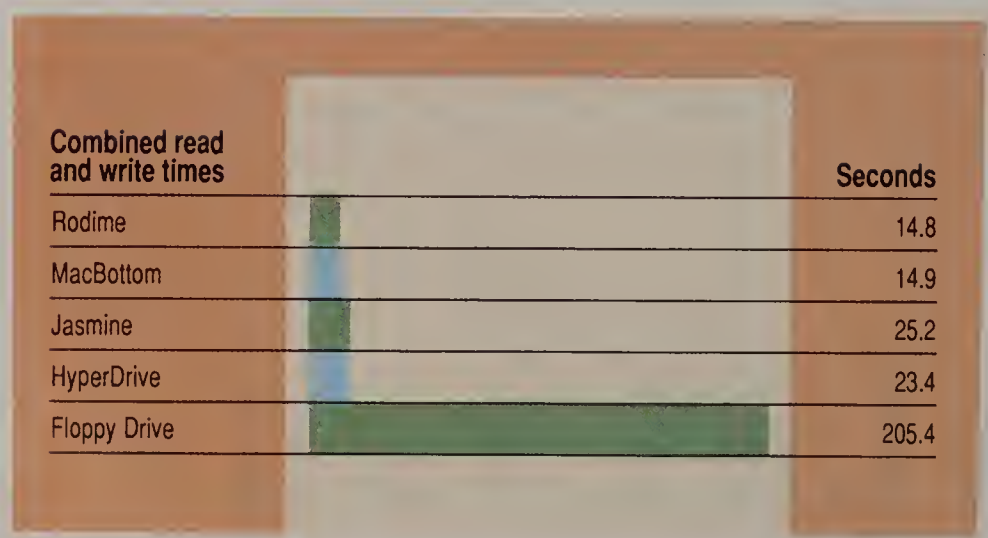
General Computer has attempted to shift responsibility for technical support to the dealers. Unfortunately, not all dealers return phone calls. I fared little better with the factory number intended only for dealers. I had to wait over 24 hours for a response, but the person who called back was knowledgeable and attentive.

Jasmine Direct Drive 50

Since you buy Jasmine hard disks direct from the factory, they're among the least expensive. Each comes with a 30-day money-back guarantee, but expect about a two-week delay.

The Direct Drive 50 comes in either beige or platinum. With its low profile, it fits nicely under the Mac but can just as easily be operated on its side. The paper air filter is visible through the ventilation slots on the front, a good example of Jasmine's attention to detail.

A switch on the back changes the SCSI address. A surge suppressor and an externally accessible fuse protect the drive and its two 110-volt receptacles. Although



This standard benchmark measures the time it takes to read to and write from the disk 100 times with a 24K file. All four drives showed similar results, comparing favorably with a floppy.

ILLUSTRATIONS BY MARK ULRICH

FRED STIMSON

there's no indicator light on the front, the drive makes a sound when it's being accessed, reassuring the user it's busy. Shutting off the drive automatically parks the heads.

The intelligently written manual is the best I've seen for any hard disk; it includes information usually glossed over or skipped entirely, such as a technical discussion of disk speed related to interleave factor. A large section on file recovery is supported by extensive software on the disk.

Of the four companies, this was the only one I could get through to for technical support on the first try. Jasmine also maintains its own bulletin board service. You can use it to leave questions or download the latest software, including a SCSI address checker, a formatter, and a mounter for those annoying occasions when the drive does not mount itself. There is even a program, to be used with caution, that can initialize the drive without erasing any of your data. However, you may wish to buy a less pedestrian backup.

As an extra bonus, the company loads its drives with 10MB of shareware and public domain programs for testing purposes and leaves it on the drive when it's shipped—a real treat for anyone who likes to try out new software.

MacBottom HD45

Personal Computer Peripherals Corporation makes no attempt to compete on price, aiming instead at the quality end of the market. The MacBottom is the smallest, lightest, and quietest of the drives considered here; yet it holds a 1200-baud optional modem.

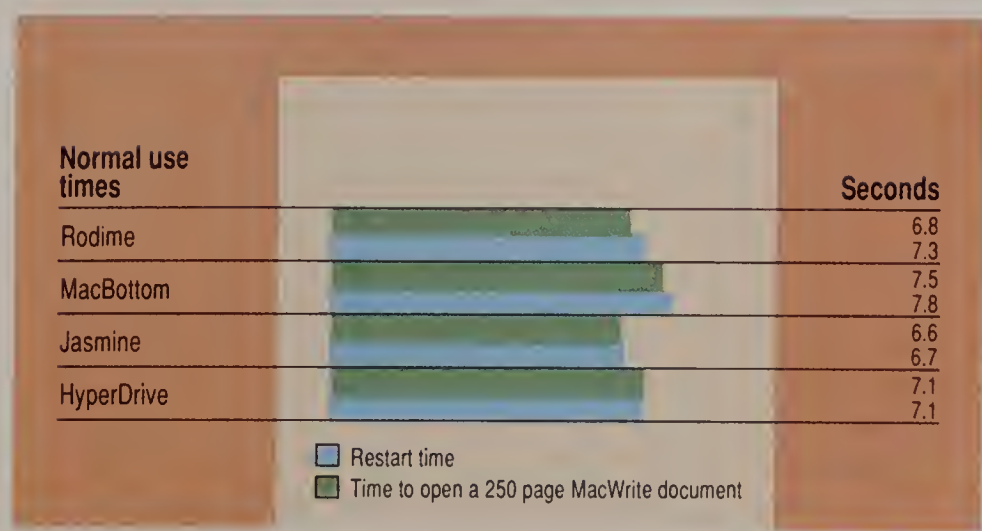
At $200, the modem is not inexpensive. It's equipped with Hayes-compatible commands, four dip switches, and a volume control. Its only unusual feature is its inclusion in the drive, which gives you one less piece of equipment to transport. The unit automatically parks the heads when it's shut down, another convenience for the traveler.

The MacBottom has a light on the front that shows disk access, and all its cables are permanently attached. The external 25-pin SCSI connector for daisy-chaining is the same as the Mac's. On the bottom of the case is the SCSI address selector, which can be changed with a few clicks of a pencil point. My only complaint is that the on/off switch, hidden on the back behind the power cord, is practically inaccessible. Since the manual has no instructions on removing the internal terminator for daisy-chaining three or more MacBottoms, you'll probably have to call the technical support number for assistance.

The software includes an excellent HFS backup program (also available separately), an ImageWriter spooler, a LaserWriter spooler, a floppy copy accessory, and a DA file finder, but no hard disk manager. The manual instructs you to erase the disk with the Finder menu choice when you need to reformat the disk. For those who are on a less-restricted budget, this drive is difficult to beat.

Rodime 45 Plus

The Scottish company Rodime makes the Winchester drives installed in many of the hard disks on the market, including some Apple drives. Therefore, I was surprised that Rodime's own release for the retail market is not more unusual. This under-the-Mac drive is good, but not special.



Although these usage-test results don't match the benchmarks, the variations between the four drives are so slight they'd go unnoticed in normal use. Any differences in raw speed would be masked by such factors as available disk space, file fragmentation, and System size and version.

I found its bulky case, with the fan attached to the back, made the drive seem rather intrusive.

The 45 Plus has an internal terminator and an external SCSI address switch that's adequate but requires a miniature screwdriver to set. There is a small light on the front of the case, but it's hard to see.

The Rodime manuals are just adequate and do not compare well with the others provided here. There is no mention of technical support beyond "see your dealer," and the manual doesn't even list a company phone number.

I used all four drives for several days within my normal work routine, and each performed flawlessly, with no perceptible differences in speed or ease of use. If forced to make a choice, I would take the MacBottom; but if price is an issue, the Jasmine would be hard to beat.—*Scott Beamer*

See *Where to Buy* for product details.

Gateway to the Future

Netway N1000A

Mac-to-mainframe communications server. ***Pros:*** *Quick and easy installation; well-written, accessible documentation.* ***Cons:*** *Terminal-emulation software could use more comprehensive macro functions.* ***List price:*** *$3195.* ***Requires:*** *512K, AppleTalk network.* ***Copy protection:*** *None.*

If you're an MIS manager looking for common ground between 3270 IBM mainframes and Macintosh AppleTalk users, Netway N1000A from Tri-Data may be the answer. It can have your Macs effortlessly talking to the company computer in a matter of minutes. The N1000A can accommodate everyone from graphic artists downloading data for charts to senior executives accessing E-mail from the mainframe.

Replacing the huge IBM 3274 cluster controller, the compact Netway box provides a gateway to the IBM mainframe, along with 3278-2 terminal emulation on the Mac. (See "Mini and Mainframe Connections," *Macworld*, July 1986, for a more detailed explanation of the Mac-to-mainframe environment.) The Netway's cost is half the $7000 to $10,000 price of a 3274 cluster controller, with one-tenth the installation hassles. And you can throw away all those clumsy coaxial cables!

Service for 16

The Netway N1000A consists of a network communications server (with a serial I/O port that supports baud rates of up to 9600) and terminal emulation software that can be placed on an AppleTalk network. As many as 16 Macintosh users can connect to the mainframe while still using the Mac interface to access data. The package also includes an AppleTalk port, an NRZI option module for line-condition selection, a modem cable, and an optional active-modem-eliminator direct-connect cable. For more complex downloads, you can get *MacMainframe*, an optional file-transfer package ($995, including network license).

Preparing to Serve

Getting the Netway N1000A up and running shouldn't require more than a few minutes' work. Just connect the cables and modem and configure the server with the SNA protocols. If necessary, you can refer to a clearly written manual that works as well for the novice as for the experienced MIS staffer. Once the server is configured, individual Macs can be set up to talk to the mainframe through the Netway (see "Mac to Netway"). A copy of the Presentation Services files showing the host and user names must be put on each user's disk. You can specify up to six macro-key assignments to automate such functions as logging on and off the system or sending your password and account number. Although some 3278 keyboard-mapping capabilities are provided, more extensive keyboard customizing would be nice.

With your Mac ready to emulate an IBM 3278-2 terminal, you're now prepared to communicate with the mainframe. At this point, you can run the macro strings defined in your configuration file to simplify logging on. The only weak links here are the limitations of the macros. Six macro-key assignments are not quite sufficient, given the number of commands you may regularly send to the mainframe. The program won't let you chain macros together to be sent in a batch; instead, you must select and execute each one individually.

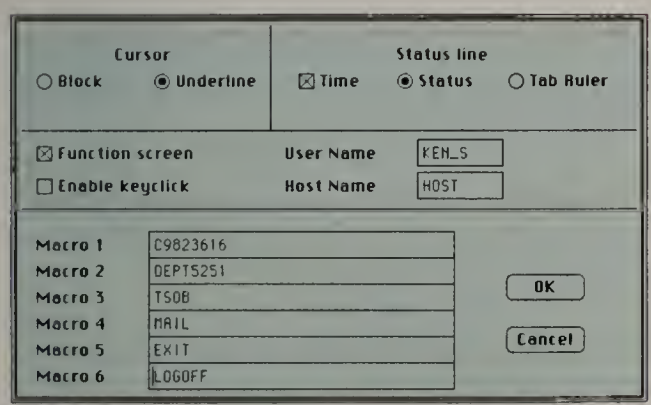
Overall though, once you're online the Netway software works well. You can either stick with the terminal-emulation

features and merely access mainframe services like E-Mail (IBM PROFS, for example) or cut and paste data from the mainframe for use in a Mac application. Since the terminal-emulation software also supports *Switcher*, you can easily toggle between the host and applications running locally on your Macintosh. (At press time, Tri-Data had not been able to test it extensively with MultiFinder but expects to do so in the near future.)

The Netway's overall performance is equal to that of the IBM 3274 cluster controller, and it is faster and easier to use than other Macintosh terminal-emulation software (such as *MacTerminal*). But perhaps the Netway's greatest advantage is that it lets you transform your data-processing environment from a centralized system dependent on a mainframe to a decentralized network of independent Macs. The Netway, in effect, turns your mainframe into a giant file server from which any Mac can download information for local processing quickly and easily, without ever leaving the friendly Mac interface. Accounting data can be downloaded and processed in an *Excel* spreadsheet, for example. You can also look forward to replacing those bulky IBM dumb terminals (and their awkward coaxial cables) with Macs.

The N1000A is a vast improvement over previous attempts to remove one of the last obstacles to integrating Macs into the corporate environment: IBM mainframe connectivity. The Netway so artfully bridges the Mac-to-mainframe gap that you'll wonder how you ever got along without it.—*Ken Smith*

See *Where to Buy* for product details.



Mac to Netway

Each Mac on the network must be configured with the Netway software before it can communicate with the mainframe. You can enter user and host names, set options for the cursor and the status line, and define macros.

High Performance

Radius Accelerator SE

68020/68881 accelerator board for SE.
Pros: *Low base price; performs as well as Mac II.*
Cons: *If you need more than 1MB of memory, the resulting price/performance ratio is higher than competitors.* ***List price:*** *$995 for accelerator board; $400 for 68881 numeric coprocessor.*
Requires: *SE.*

The only way to improve the performance of your SE is to upgrade its processor. Four developers—Levco, Peak, General Computer, and Radius—offer MC68020/68881 accelerator boards to accomplish this. Levco and Peak supplement this combination with an MC68851 paged memory management unit (PMMU), while General Computer and Radius do not. (For a discussion of other boards, see "Beefing Up the SE," *Macworld*, September 1987.)

The Radius Accelerator for the SE is a $995 replacement CPU board that plugs into the expansion slot and uses an onboard 32-kilobyte cache to speed up access to memory on the system board. You may fill the floating-point coprocessor socket with a 68881 for an additional $395, or allegedly with a 68882 (when it becomes available) for even higher-speed math functions.

Running a 68020 as the CPU in a computer designed to run a 68000 at half the clock rate requires some changes in the storage architecture. To supply the 68020 with instructions and data as fast as it needs them, the accelerator board's memory must be twice as fast as the SE's. Also, because the 68020 can read 4 bytes at a time, the add-on board's memory should be accessible 32 bits at a time, rather than the SE's normal 16 at a time. If the memory system is fast enough, a Mac with a 68020 running at double the SE's clock speed would operate at four times the speed of the SE's 68000.

In addition, applications using real arithmetic (and especially math functions) run from 10 to 100 times faster than a regular SE if you install the optional 68881 and compile code to use it. Even applications that use Apple SANE will be automatically routed to the 68881. Radius ROM routines are smart enough to use the 68881 when it is present.

Instead of providing 1 to 4 megabytes of faster, 32-bits-wide main memory (as most add-on board makers do), Radius uses the system board's existing memory and incorporates a small amount of faster static RAM that can keep pace with the faster and wider accesses required by the CPU. This write-through caching scheme can be used to speed access to either application code or data or both. Or on machine start-up, you can disable the accelerator board and run your SE in its original form.

The Macintosh II inserts two wait states each time the CPU fetches an instruction or data from memory. An SE with a 68020 CPU accelerator running at almost 16 MHz, that can access memory with fewer than two wait states, has the potential to run faster than a Mac II.

Most of our tests found that the performance of the Radius Accelerator is nearly as good as a Mac II for most applications. *PageMaker*, *Word*, and *Excel* perform at least two times faster than on an unenhanced SE.

Cache Me If You Can

The 68020 can store 256 bytes of instructions in its cache and execute these instructions quickly. This can help prevent some of the waiting for memory fetches on a system bus. The advantage is realized when tiny loops in programs can fit entirely in the cache, so that after the first pass through the loop, the 68020 doesn't have to fetch instructions from memory. The 68020 can then run applications containing many small loops faster than if every instruction were fetched from memory.

Often if the main memory is slower than the CPU, a cache can help reduce the effects of wait states. On the other hand, programs that branch extensively can defeat the cache by making diverse program and/or data references, requiring the cache to be frequently flushed and refilled. This condition is called *thrashing*. The performance of a cache memory architecture therefore varies widely among different applications. On average, the Radius board is about 15 percent slower than some other, costlier boards (like the Prodigy SE or the HyperCharger), which contain full replacement memory.

Compatibility

Not all manufacturers wrote their original Mac applications so that they'd run flawlessly and efficiently on 68020-based Macs. For example, applications like *SuperLaserSpool* and *Lightspeed Pascal* have a tendency to crash on the Radius board (and on the Mac II). (That problem should be short-lived, since manufacturers are rushing to fix such incompatibilities.) You can currently run those applications on the Radius board in 68000 emulation mode. Other applications have problems on Radius when the instruction cache is turned on.

Extendability

The Radius board provides a bus extension connector to which you can attach the Radius Full Page Display for higher-resolution large-screen graphics. Unfortunately, you cannot hook up any other large-screen monitor to an SE equipped with the Radius accelerator board. You can expand the memory up to 4MB with 1MB SIMM modules, but 1MB chips are very expensive. You add memory expansion boards to the system board, as you would do with a stock SE.

System Performance Benchmarks

Benchmarks are deceptive. We ran standard benchmarks like the Whetstone, the Dhrystone, and the Sieve of Eratosthenes—which may not tell the whole story. To add to the confusion, the same benchmark compiled in different versions of C showed a 50 percent variation in performance. In addition, we wrote a C program ourselves to test the accelerator board. The Henon program tests the overall accelerated SE system performance and is large enough to exceed the capacity of the cache. Unlike some simple numerical benchmarks, it also makes a large number of QuickDraw calls to draw graphics on the screen. The program was compiled like other benchmarks with a 68020/68881 version of *Consulair MacC*. In addition, we also carried out real-life tests, like measuring the time to open an application, quit an application, and scroll within a document, to find out if Radius accelerator performance is at least comparable to that of the Mac II.

Recommendations

The Radius performed fairly well, considering that it does not have the 32-bit memory and disk cache other accelerators do. Benchmarks were comparable, so if you are just looking for a low-priced accelerator, this is the one. In addition, you may not notice the difference between a Radius-accelerated SE and a Mac II for day-to-day applications.

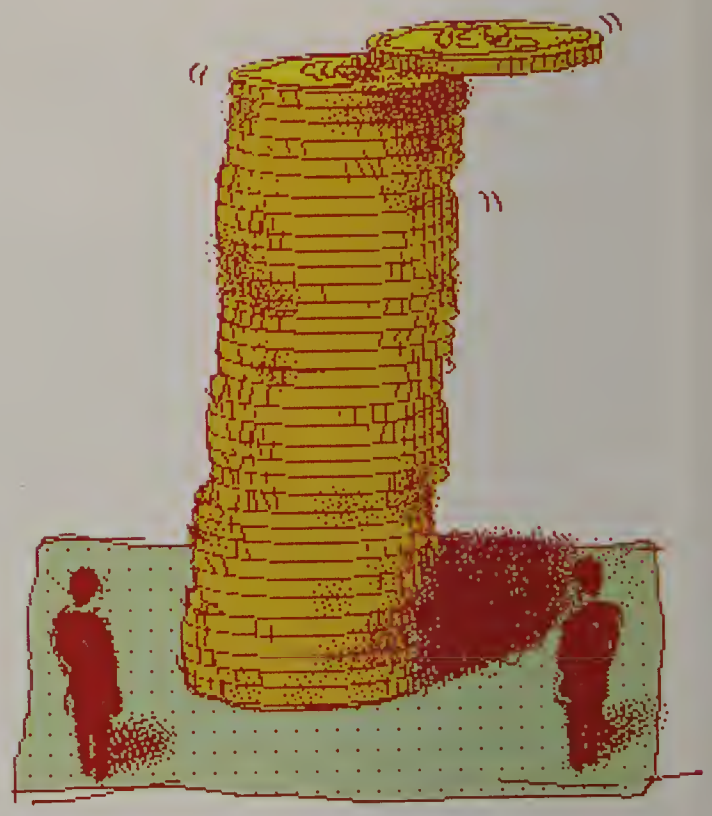
But if you are interested in UNIX or true multitasking, or have memory-intensive applications, we recommend the Levco Prodigy SE over the Radius. Also, if you are interested in large-screen landscape monitors, you'd be better off buying either a Levco or a GCC board, since the Radius board works only with the Full Page Display.

Overall, the Radius board is a reliable, low-end Mac II substitute for the SE.
—Prasad Kaipa and Robert Davis

See *Where to Buy* for product details.

Benchmark Results
Benchmarks for a Mac II and an enhanced Mac SE. A special C compiler producing 68020 code and direct 68881 calls was used. The graphics benchmarks were compiled with Turbo Pascal *version 1.0.*

	Mac II	Radius
Calculation Benchmarks		
Whetstones	558,600 per second	638,300 per second
Dhrystones	2808 per second	2216 per second
Floating-point operations	18,540 per second	19,354 per second
Special Henon benchmark	165 seconds	233 seconds
Graphics Benchmarks		
Slanted lines (8000)	38.6 seconds	29.0 seconds
Rectangles (2000)	7.3 seconds	7.1 seconds
Circles (200)	3.6 seconds	2.8 seconds
Text (38,000 characters)	4.1 seconds	3.4 seconds



Money Worries?

MacMoney *2.03*

Personal financial software. ***Pros:*** *Low price; easy to learn; very good tech support; fast data entry; flexible report generation.* ***Cons:*** *Some features are of questionable value; beginners can be overwhelmed by too many choices; no tutorial or demo data provided.* ***List price:*** *Version 2.1 $98.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

Instead of feeling like a victim of your financial circumstances, you can use a program like *MacMoney* to gain understanding of your financial situation. You can then use that information to make decisions, such as determining whether you can afford to move into an apartment and get a new car if you get only a 5 percent raise next year.

Survivor Software's *MacMoney* will help you balance your checkbook, as well as write checks and alert you when bills are due. In fact, it will even write the checks for you. It can help you develop a budget, fill out tax returns, and prepare a first-rate financial statement to show a loan officer. Although the bookkeeping is not set up with general ledger, payable, and receivable modules, small-business owners may find the account-handling capabilities adequate for their needs.

Though beginners may be intimidated by the large number of menu choices available, getting started is really quite simple. Just put your beginning balance, and you're ready to enter the information from your last bank statement. Because you can shift entries between categories at any time, you can put all your entries in one or two categories until you get a better feel for the program. The back of the manual lists several common catagories like salary, rent, car expenses, and entertainment. Similar to the chart of accounts found in business accounting, the list of categories lets you sort transaction information into reports.

No One Does It Faster

Data entry is extremely fast. Three lists (Names, Categories, and ID Codes) appear on the screen at the same time. Many entries can be typed into these lists just once—ever. The three lists include the most common transaction names and categories, so you need only point and click to fill out a data entry form. For a typical entry you might click on the name of a supermarket. The program automatically inserts the payee, Safeway; the category, Food; the date; and the check number. Just fill in the amount and press Enter. The form looks like a check, but you can change it to resemble a deposit, credit card charge, withdrawal, or service charge slip.

Each bank account or credit card has a separate register of transactions. You can even have a register for cash, in case you want to see how all that ATM money gets spent. You can split individual transactions, for instance, if you want mortgage payment interest and principal credited to separate categories.

Experienced bookkeepers will be pleased to discover that the program handles errors in a traditional manner. *MacMoney* lets you add a Void category, use the memo line for transactions, produce an audit trail as a standard report, and reconcile bank balances. Another flexible feature is the ability to edit every transaction, even months later, so you can shift transactions from one category to another.

You can mark routine transactions such as mortgage or car payments so that the program automatically reminds you when they are due. With just a few mouse clicks you can adjust the amounts, enter them in your check register, and print out the checks on your ImageWriter. Sample checks are included in the package.

Where Does It All Go?

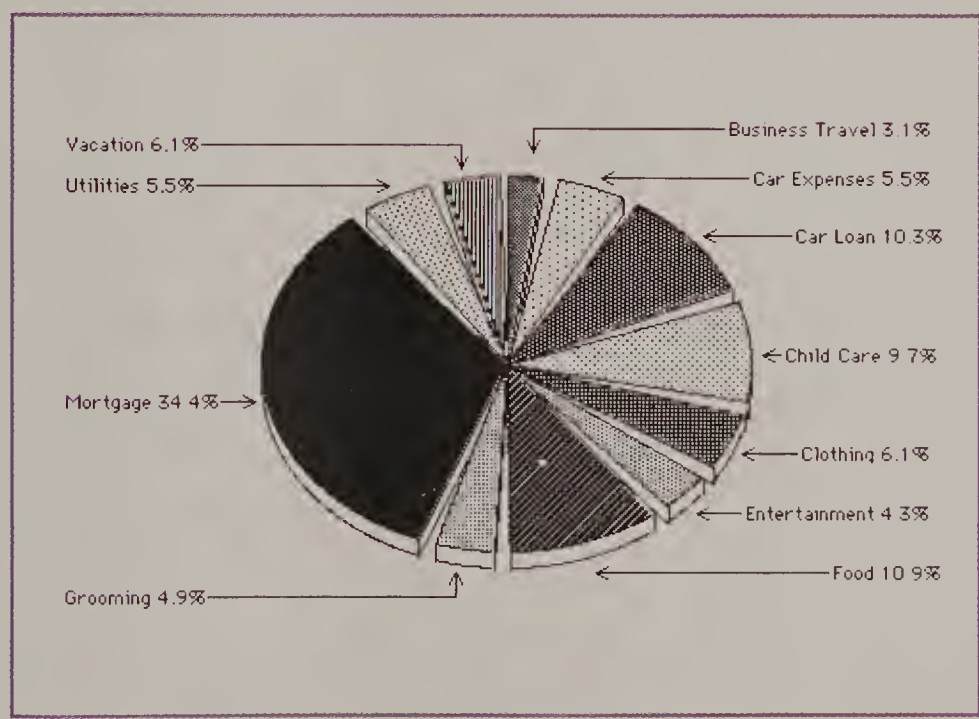
It takes a while to become familiar with the numerous controls on the two report-generating screens. With so many buttons to choose from, beginners may find it confusing to set up customized reports. These choices, however, offer a range and control in report preparation that is superior to more expensive accounting programs. *MacMoney* includes Income & Expense and Balance Sheet as standard reports, and Budget vs. Actuals and Net Worth for displaying data graphically. You can also create customized reports as templates for later use. It's easy to customize graphic reports; my favorite is one of the standard menu choices, a pie chart of the largest expenses from the last month (see "Graphing Expenses"). *MacMoney* lets you save reports in ASCII format, allowing data export to any program that accepts text files. This could be useful if you want to further analyze your financial data, say, with *Microsoft Excel,* or dress up a report with a desktop publishing program. Graphs can be exported through the Clipboard.

MacMoney is slow to open and takes up a lot of disk space. To optimize disk space, you should put the three planning menu options (Loan Planning, Retirement Planning, and Future Value/Goal) on a separate program disk. These modules are not necessary for the operation of the program, and in fact there is no way to transfer the planning information to or from the main program. The only module I personally find useful is Loan Planning, which enables you to print an amortization table for a loan or enter some variables and have the program compute the missing ones.

If you find you need it, you'll appreciate Survivor Software's thorough technical support. When you call, you get a person, not a busy signal or an answering machine. The chief programmer and company president frequently respond to the Mac Users Forum section on CompuServe. Survivor Software also participates on GEnie, The Source, and MCI Mail. The documentation is adequate but would be improved by the addition of a tutorial and demo data on the program disk. The manual does provide good examples of personal, business, and tax-related categories. Version 2.1, which should be available by the time you read this, will offer the options of using account numbers, setting the start-up configuration, and including running balances in reports.

Survivor Software seems committed to providing its customers with good value for their money, a goal achieved with *MacMoney* perhaps better than with any other software I know. Still, those with modest needs may prefer a less elaborate program; on the other hand, *MacMoney* won't fulfill the needs of business users who want to keep more traditional books. But for most people with money concerns, it should prove an invaluable tool.—*Scott Beamer*

See *Where to Buy* for product details.



Graphing Expenses
One of MacMoney's *standard graphs shows the largest expense categories from the previous month. By using the program's standard and customized reports and graphs, you can easily analyze your current financial situation.*

Four-Wall Challenge

MacRacquetball

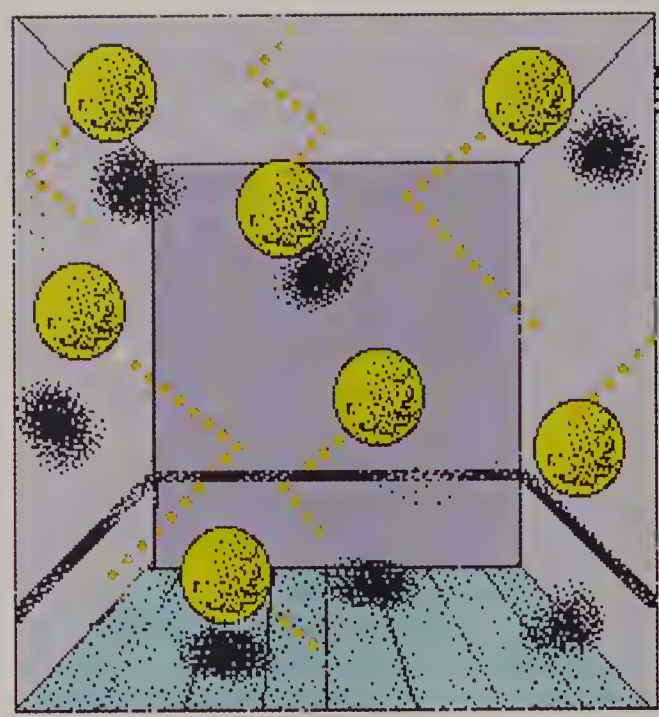
Sports simulation game. ***Pros:*** *Sophisticated, realistic maneuverability and shot-making.* ***Cons:*** *Takes a long time to attain competency.* ***List price:*** *$59.95.* ***Requires:*** *Mac Plus.* ***Copy protection:*** *Not copyable.*

MacRacquetball is the new racquetball simulation game from Practical Computer Applications, the company that produced the popular *MacGolf*.

MacRacquetball games are played against the computer or against an opponent via modem or ImageWriter II cable (an AppleTalk version should be available by the time you read this). When you load the game disk, a configuration screen with a series of vertical scroll bars appears. These bars let you select and adjust the abilities and tendencies of the players. Certain scroll bars control a player's strength, stamina, agility, and accuracy. Others determine predilections for types of serves (like drives and lobs), or volley shots (kills, passing, and ceiling shots), as well as the three hitting motions (forehand, backhand, and overhead). The player's predominant style is designated by adjusting the settings labeled Aggressive, Reactive, and Defensive. Probably the most important scroll bar is the one that controls the speed of the ball: Game Speed. The higher the Game Speed setting, the greater the demands on your reflexes, which are not inconsiderable even at lower settings.

While you can adjust the scroll bars for your computer-opponent, the game limits the number of adjustments you can make for your own player. You can set strength, stamina, and agility, but your player's overall style, serve, and shot selection are determined as you play.

When you've adjusted the scroll bars for both players, you're ready for the court (although at any time in the game you can easily return to the configuration screen to adjust the characteristics).



Court Sense

You can choose the Warm Up mode to play by yourself, or you can go directly into a game. As the players enter the four-walled court and prepare for service, you're presented with a full-perspective 3-D court. The players are digitized from live-action videotape and perform with impressive realism. To serve—or to execute any shot—you press the mouse button, releasing it as you push the mouse forward. Then you must move your player into position for the return. Determining exactly where you want your player to run is a real challenge. Even at a Game Speed of 20 percent you must quickly determine the best position for intersecting your opponent's caroming shots. Geometry was never my forte; I played for hours before developing somewhat "instinctive" responses.

The player runs in the direction you move the mouse, but more slowly. A dark square on the court moves in unison with the mouse, showing where your player is headed. It's important to focus on the square; if you focus on your player, the time lag between the mouse's and the player's movements can be confusing.

The manual warns that pushing the mouse too slowly will make your shot fall short, and a push that's too fast will send your shot higher than you want. This mouse-pushing procedure is difficult to master; in fact, other than while serving, I had no success applying it. My mouse thrusts often seemed to have no effect whatsoever, but that may have been due to poor player positioning. However, you can return some shots without moving the mouse, simply by getting your player into position and clicking the mouse button.

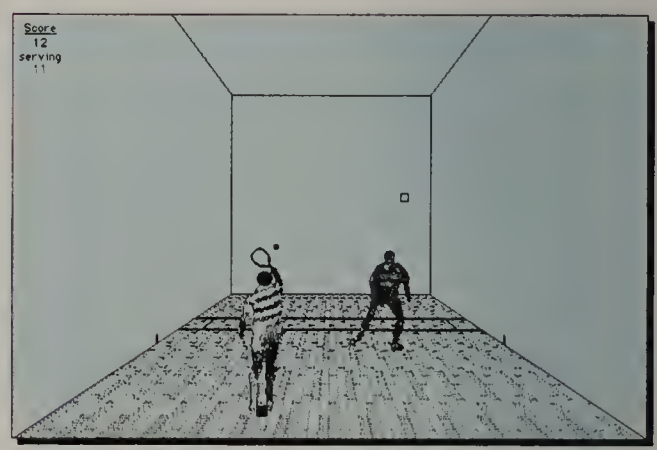
Ready, Aim...

The point where you intend your shot to go is the aiming spot, which appears as a square or a diamond, depending on which wall (or ceiling) you direct it to. You control this aiming spot by holding down the Command key and moving the mouse. Skillful manipulation of the spot depends on quick recognition of where your opponent's shot is headed. The operations are sequential: first get your player positioned, then maneuver the aiming spot. Developing adequate coordination of the two operations can be a slow and tedious process (one I'm still learning). However, the first time I swept the aiming spot to the rear wall and saw my player turn 180 degrees to drive his shot against it, my feeling was pure excitement. The ability to place a shot anywhere on the court takes the game to a sophisticated level of play. Playing over the modem against a live opponent is also great fun and can result in a fascinating tactical battle.

Final Rally

MacRacquetball is an extremely challenging game, and not without nuisances. I've yet to understand the spatial relationship that results in my player being struck by the ball, thus losing the point. And sometimes my computer-opponent's behavior makes no sense. In a 21 to 0 game, I served every ball to the same place on center court and the opponent failed to return a single shot.

Expertise comes slowly. Manipulation of the mouse, recognition of shot angles, and control over the aiming spot are all dif-



Volley

Your player is in position to return your opponent's shot off the rear wall. Direct your return shot by moving the aiming spot (small square).

ficult to learn, let alone to combine into smoothly coordinated play. Sure, you can slow the game down to a crawl, but you'll derive little pleasure from waiting for the ball to finish its slow motion bouncing after each point. I suggest you start by playing at the recommended levels and player configurations, but play for short periods of time and walk away before acute frustration sets in. Occasionally you'll move fluidly and instinctively, making deft shots. Such moments reveal a game of tantalizing possibilities—one of the most sophisticated sports simulations I've encountered.
—Richard Miller

See *Where to Buy* for product details.

Solid State

***TDI Modula-2 for the Macintosh, Developer's Version** 1.00A*

Development environment. ***Pros:*** *Generates fast, compact code with full Toolbox access; compiles textbook-style programs; not limited by 32K segment size.* ***Cons:*** *Sketchy documentation; buggy editor; can't compile large source modules (over 32K).* ***List price:*** *Version 3.00A $149.95* ***Requires:*** *512K.* ***Copy protection:*** *None.*

For those of you who have been waiting for a solid, inexpensive, native-code Modula-2 compiler for the Macintosh, your wait is over. *TDI Modula-2 for the Macintosh* shares the strengths and weaknesses of its predecessors, TDI's other Modula-2 compilers for Motorola 68000-based systems (Pinnacle, Atari ST, and the Amiga).

As a development tool, TDI's editor has a number of problems: it doesn't consistently recognize tabs, the automatic indent doesn't work, and it is slow handling files larger than about 10K. The editor does recognize invisible markers that the compiler puts in the file when it finds an error, however, which helps you locate compilation errors quickly. (Whatever editor you use, do not include tabs in the file, or the compiler will flag them as illegal characters.) TDI's prerelease version of 3.00A has fixed bugs in the editor, although it is still somewhat limited when compared with other program editors.

How Much, How Soon, How Fast

Development Environment	Application Size (in bytes) MiniEdit	CatchMe	FileDemo
TDI Modula-2 1.00A	11,861	4928	8520
TML Modula-2 1.0	12,982	4606	7986
TML Pascal 2.02	10,611	3894	6809
MPW C 2.0B1	12,112	4228	7143

Three programs were used to gauge how large an application each development system generates: MiniEdit, *by Stephen Chernicoff;* CatchMe, *by Bob Perez; and* FileDemo, *by Chris Morgan.*

Development Environment	Compilation Time (in seconds)
TDI Modula-2 1.00A	212
TML Modula-2 1.0	176
TML Pascal 2.02	89
MPW Pascal 2.0B1	181

This table shows how long each system took to compile and link MiniEdit *to create a stand-alone application.*

Development Environment	Solution Time (in seconds)
TDI Modula-2 1.00A	0.4
TML Modula-2 1.0	0.8
TML Pascal 2.02	0.8
MPW Pascal 2.0B1	0.8

TDI Modula-2 *was able to solve* Towers of Hanoi *with 9 disks in half the time it took the other systems.*

The compiler is very efficient at generating compact code that executes quickly. But since it is a five-pass compiler, it's not very fast (the upgrade is speedier). Be careful not to compile large implementation modules (64K of heap space) or the compiler will run out of memory and fail.

The linker is also solid and efficient, eliminating unnecessary code. Interfaces to the Macintosh Toolbox (as described in *Inside Macintosh,* vols. 1-4) are included, as well as the standard Modula-2 libraries described in Wirth's *Programming in Modula-2* (the unofficial standard for the language). One of the source examples is the M2Shell, a Finder/MiniFinder alternative, which is also a part of the development environment. In addition to the M2Shell, TDI provides a number of other examples, including 3-D graphics and multitasking. The system is neither *MDS*- nor *MPW*-compatible, which limits its access to existing libraries written in other languages; however, machine-level access is provided via in-line CODE statements. Tools provided with the package include a source cross-referencer, an object code disassembler, and a communications program (a Kermit variation).

When you're using either the compiler or the linker, you'll see very little of the Macintosh interface. Instead you'll get a progress window without menus, where you are prompted with Standard File dialogs. When you click Cancel in the SFGetFile dialog, you exit the program and return either to the M2Shell or your Finder equivalent.

Although the documentation gives complete descriptions of the libraries and the system's general operation, no starting point is provided for Modula-2 novices. Specifics are poorly covered with sketchy information and too few examples. (TDI has promised rewritten documentation for version 3.00A.) However, helpful technical support is available by phone or via CompuServe.

If you're interested in programming your Macintosh in Modula-2, this package will provide a solid base; but if you are new to Modula-2, you will need additional references. *Inside Macintosh* is a must for anyone planning to program the Mac, but it is not a tutorial. I recommend *Macintosh Revealed* (vols. 1 and 2) by Stephen Chernicoff as a good introduction, since its Pascal approach adapts fairly easily to Modula-2. Experienced Macintosh programmers who are familiar with Modula-2 will find this package a pleasure to use. Those who plan to develop large applications, though, might want to consider another environment.—*Dennis Cohen*

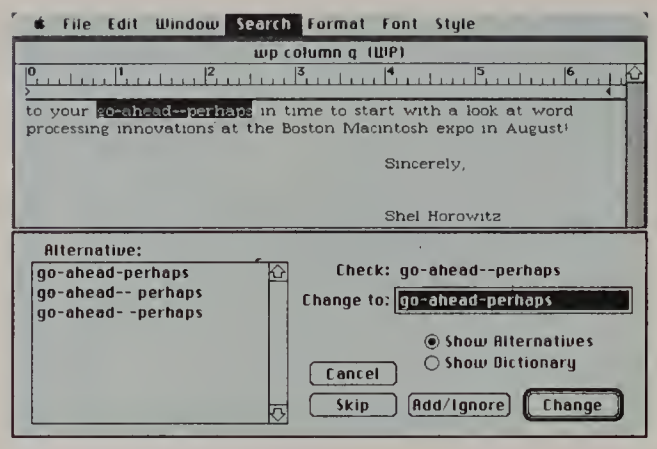
See *Where to Buy* for product details.

Works Writing Enhancer

***WorksPlus Spell** 1.0*

Spelling checker for* Microsoft Works.** ***Pros: *Seamless integration with* Works; *fast; good at suggesting corrections; sensitive to case and transpositions.* ***Cons:*** *No word counter; hyphenation problems on a 512K; some questionable dictionary entries.* ***List price:*** *Version 1.0A1 $59.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

WorksPlus Spell adds a spelling checker, hyphenation capability, and a limited glossary to the word processing module of *Microsoft Works*—giving users more of the power found in *Word* 3.0, without sacrificing *Works'* friendliness and simplicity.



Spelling Corrections
Here the screen displays the usual spelling-checker choices: Cancel, Skip, Add/Ignore, and Change.

The Spelling Bee

WorksPlus Spell checks spelling against a 70,000-word dictionary, either interactively as you type or after you select a section of text. This fast-working program lets you access the dictionary to look up, add, and remove words, and it's also good at suggesting appropriate alternatives. The dictionary must be kept on the desktop, however, since it can't be accessed from within a folder.

When the spelling checker is running, it's impossible to change anything other than a highlighted word, but it's easy to interrupt the checking process and return to the document. When called upon to find a correction for a possible error, the program offers standard choices (see "Spelling Corrections"). But *WorksPlus Spell* has two peculiarities: the default choice is Change rather than Skip, and adding a word to either the document's dictionary or the main dictionary requires two steps.

The program recognizes capitalization, which reduces the number of words unnecessarily flagged, and it's also good at recognizing transposed letters. Despite these unusually nice features, *WorksPlus Spell*'s dictionary appears to contain some incorrect spellings and some very rare words that could frequently represent typos—such as *abjection, shads, yttrium,* and *zaire.*

And the Extras

The hyphenation program works either automatically or along with the hyphenation helper, which asks the user to approve each choice. The automatic version requires a big chunk of memory; it won't load on a 512K Mac and will crash a Mac Plus if used with the spelling checker in interactive mode.

Hyphenation is flexible, automatically reformatting when line length is changed or text is added. Undoing a hyphenation without changing the text involves reselecting that portion of the text and running the hyphenation helper again. Users can set the minimum number of characters on both sides of the hyphen, but the program defaults to the standard setting at the next work session.

The glossary works well, as long as you choose an abbreviation that isn't in the main dictionary. However, there is no way to embed a carriage return into a glossary entry. Version 1.1 is expected to allow both permanent changes in hyphenation preferences and carriage returns in the glossary.

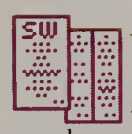
All in all, *WorksPlus Spell* adds some useful features to *Microsoft Works.* And if the upgrade successfully addresses the minor flaws of the current version, it will be better still.—*Shel Horowitz*

See *Where to Buy* for product details.

Behind the Scenes

***Scriptwriter** 1.17*

Scriptwriting and word processing package. ***Pros:*** *Versatile scriptwriting and editing features; advanced word processing capabilities.* ***Cons:*** *Learning dual-column editing takes some effort; master disk required for leaving the Finder.* ***List price:*** *Version 1.25 $495.* ***Requires:*** *512K.* ***Copy protection:*** *Key disk.*



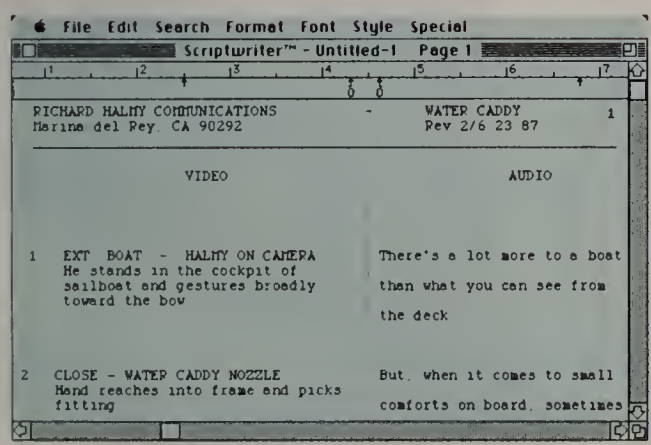
American Intelliware's powerful new theatrical and audiovisual scriptwriting program provides a much-needed tool for those occasions when the director stops the cameras and says, "Let's look at that script again." *Scriptwriter* allows for just about every contingency: changes, additions, deletions, and those last-minute do-it-all-over-again requests that are inevitable with scriptwriting.

High-Powered Scripting

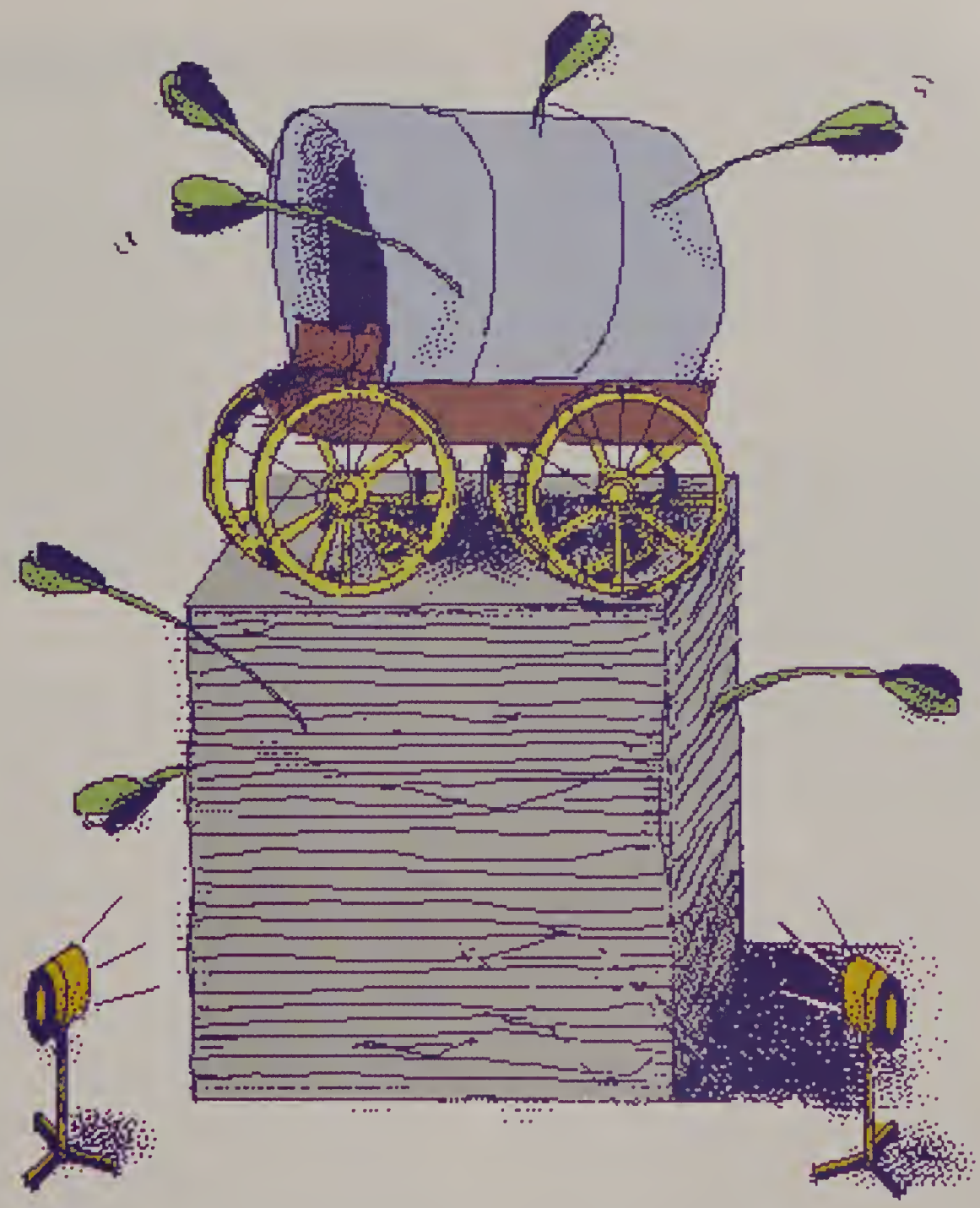
Scriptwriter offers screenplay and dual-column formats, as well as a word processor that supports a variety of professional scripting applications. News, docu-

mentary, and industry writers will be particularly pleased with *Scriptwriter*'s effective dual-column capabilities, although it takes some time to become adept at using the dual-column editing features. Television and motion-picture writers will appreciate *Scriptwriter*'s automatic setup of scene and page numbers, along with an unlimited glossary function that allows single-key insertion of character names, scenes, parentheticals, dialogue insertion points, and script instructions. As you add, delete, or edit scenes, *Scriptwriter* automatically renumbers them as required. When you're working with scripts that can easily go over one hundred pages, automatic renumbering of scenes saves considerable time and energy.

Perhaps *Scriptwriter*'s most valuable feature is its autopagination, which automatically breaks the page at an appropriate point, inserts a transitional word (such as *continued*), proceeds to the next page, and adds the character identification. You can also choose page-break options, such as Break Only After Dialog. Following your instructions, *Scriptwriter* determines whether to break the text or move the scene, dialogue, or block of words to the next page. You can program the autobackup to save work in progress whenever keyboard input is halted, even for as short a period as 15 seconds. *Scriptwriter* offers two other useful features, which are not available on any other scripting program: a TelePrompTer mode, which lets you scroll long scripts at variable rates without relying on the mouse, and the ability to print help files without forcing you to quit the program—so you can refer to hard-copy notes as you go along.



Dual-Column Mode
In its dual-column configuration, Scriptwriter *lets you choose single or variable spacing in either column. It's the only scripting program to offer this advantage.*



Scriptwriter's fast word processor takes full advantage of the autopagination, page-breaking, and autobackup features. You can use its special spell-check file format with existing spelling checkers, and you can save files in ASCII (text-only) for transfer to other word processors. *Scriptwriter* supports unlimited windows but will not process footnotes, nor will it import graphics into the body of the text, though graphics can be imported into header and footer locations. After reviewing your word processing requirements, you may decide that you don't need any other word processing software.

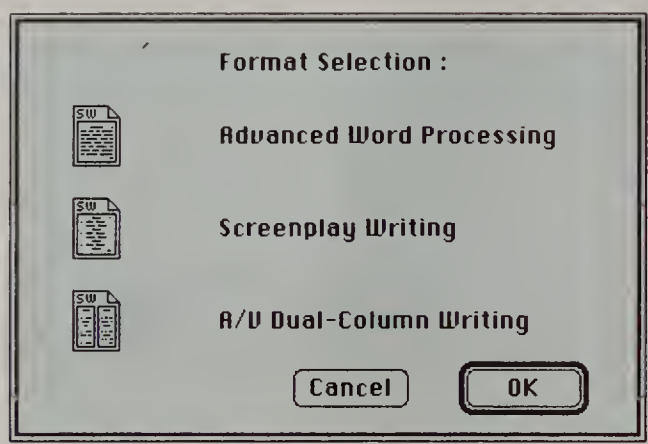
Top Billing

Although several packages exist for scriptwriters, including *Scriptor* and *CineWrite*, *Scriptwriter* appears to be in a class by itself. *Scriptor* is a formatting program that lacks a word processor and works only with *Microsoft Word* 1.05. Mac3's *CineWrite*, developed in France, is *Scriptwriter*'s closest competitor; it offers both screenplay and dual-column script options, but its limited editing capabilities in dual-column mode make it clearly inferior to *Scriptwriter*.

Like *Scriptwriter*, *CineWrite* allows different character names and scene descriptions to be entered with two or three keystrokes, but it offers neither *Scriptwriter*'s intelligent page-breaking nor its autopagination. Unlike *Scriptwriter*, *CineWrite* allows you to see the final format only when you print it out. And it offers only one font (Chicago), while *Scriptwriter* supports loadable and downloadable fonts in 9- to 24-point sizes.

Rather than combine storyboarding and scriptwriting in a single program, as Mac3 did with *CineWrite*, American Intelliware chose to develop a separate program called *Storyboarder*, which includes special formats for desktop publishing.

presentation graphics, and sophisticated animation. Although *CineWrite*'s storyboard feature lets you program *MacPaint* files to run in real time along with scene lists and descriptions, these effects take up so much memory that you'd probably need a hard disk to use them. Together, *Scriptwriter* and *Storyboarder* provide many more useful professional features than does *CineWrite* with its simpler graphics capabilities.



Flexible Formats
From the Finder you select one of three formats: screenplay, dual-column, or word processing. Each format uses all of Scriptwriter's *intelligent features, including autopagination, page breaks, and autobackup.*

CineWrite offers a number of production tools (shot lists and notes) that are likely to benefit only a story promoter, film director, or production manager. Such extras are of questionable value to the writer and actually limit *CineWrite*'s scripting potential. It seems as if *CineWrite*'s developers couldn't decide whether to support writers or production planners. By aiming at both, they've created a program that doesn't fully support either. On the other hand, by emphasizing scripting and editing functions in one program and professional graphics and animation in the other, American Intelliware has managed to accommodate both groups.

The company also offers excellent user support through a toll-free number and provides an unlimited number of software upgrades for a one-time fee of $25.

Fast, powerful, and easy to use, *Scriptwriter* can, not surprisingly, be found in a wide variety of applications. It's being used by the U.S. Navy, Honeywell, Universal Studios, and "The Cosby Show." For a writer to whom the play's the thing, *Scriptwriter* certainly has the decided edge.—*Richard Halmy*

See *Where to Buy* for product details.

A Little Byte Music

Studio Session 1.0

Music composition software package.
Pros: *Easy to use; excellent learning and composition tool; good sound reproduction.* ***Cons:*** *Not yet MIDI compatible.* ***List price:*** *$79.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

Here is a unique product for the Mac that makes it possible for the most unschooled, ten-thumbed musicians to compose and play their personal masterpieces. On six instruments, no less.

One Piece at a Time

Studio Session has two main applications: the composition, arrangement, and playback of your own creations; and the mixing and mangling of the 21 sample songs and the 91 different "instruments" included in the sound library. Two additional sound library disks, the *Heavy Metal Music Disk* and the *Country Music Disk,* can be purchased separately. *Studio Session* also has a composition phrase library consisting of segments of the sample compositions, which can be pasted together at your discretion. You can also create your own segments and add them to the library.

Studio Session works best on a hard disk, but functions quite satisfactorily on a Mac 512K system if you don't mind occasional disk swapping.

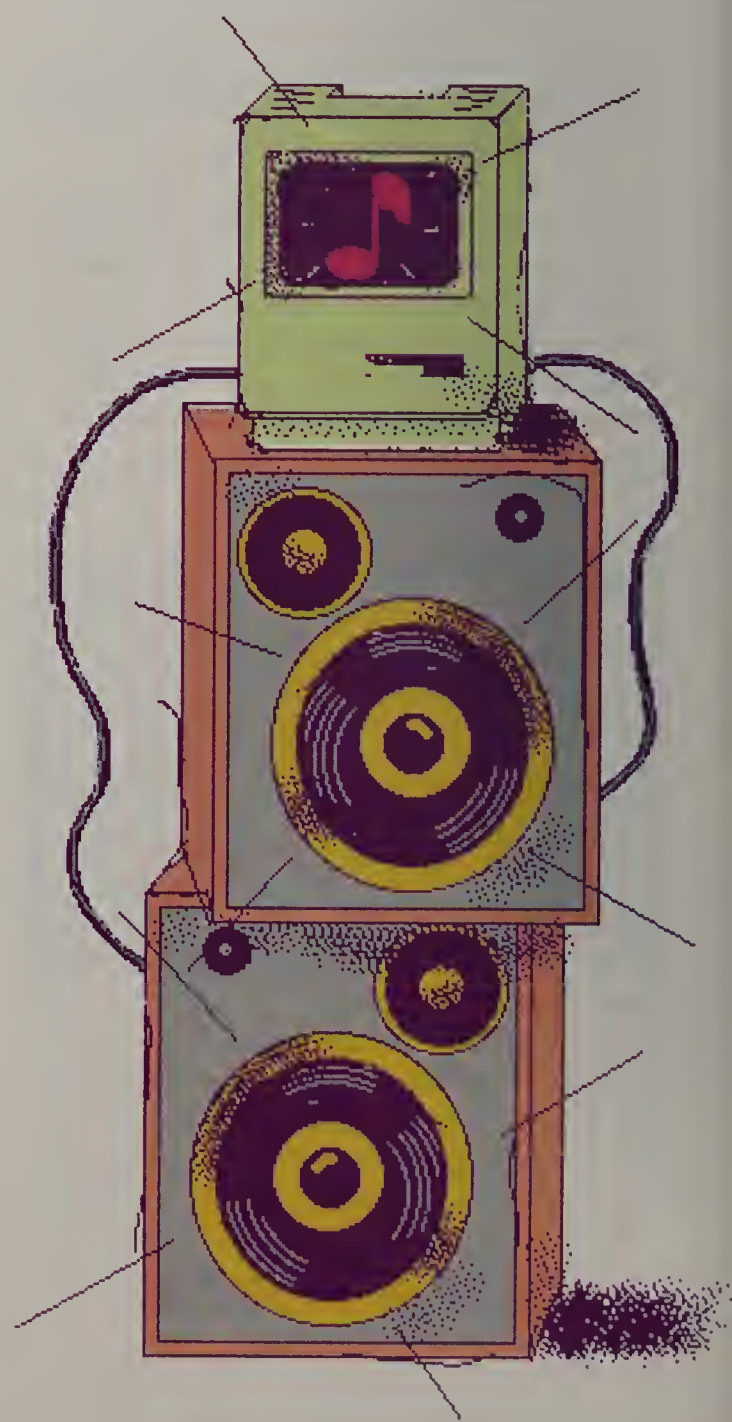
When you start up *Studio Session,* you are presented with three icons: Player, Editor, and Phrase Library. For a quick view of what's going on, click on Player. An image of a tape player appears with six VU meters across the top, which allow you to control the activities of each music track. Below the VU meters are the buttons you'd expect on a tape player, as well as tempo control. There is even an animated cassette tape that plays, rewinds, and fast forwards like the "reel thing."

Before you can play a composition, all the required instruments must be in memory. Here's where the disk swapping comes in—the instruments are located on Music Discs 1 and 2, arranged in alphabetical order. Once the instruments have been loaded, click the Play button and listen. For the full effect of *Studio Session,* you should attach an external speaker to the Mac; better yet, plug the Mac into a stereo.

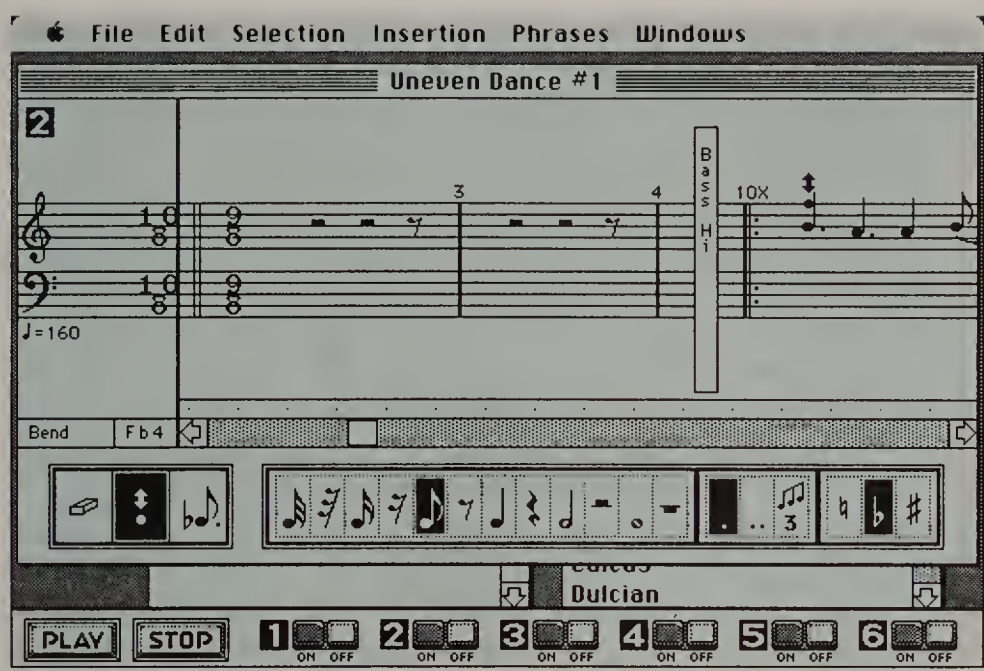
To alter existing song files, or to create new ones, you use the Editor. An entirely separate application from the Player, the Editor displays one of six staffs (or tracks), on which you place notes and other music notation by pointing and clicking. You can then build your composition by switching between staffs and adding new lines. (By the time you read this, a new version of *Studio Session* will probably be available, with eight tracks and full MIDI capability.) Whole sections can be cut and pasted from one score into another, and transposed up and down by an octave or a half-step at a time. You can also bend notes, tie notes together, and "swing" sections of your score. You can assign different time and key signatures and tempos, and change instruments anywhere in the score.

Spike Jones, Eat Your Heart Out

I took *Studio Session*'s version of the theme from *2001* (*Also Sprach Zarathustra*) and replaced the crescendo horn section with digitized crowing roosters.



Compose Yourself
The Editor is at the heart of Studio Session. *Here you build your composition—adding notes and rests, selecting time signatures and meters, and choosing instruments.*



Frivolous, perhaps, but it demonstrated the software/movie/video/animation soundtrack potential of this system for comedic, new wave, and "third-stream classical" productions in addition to more traditional applications.

Studio Session's documentation is among the best I've ever seen. Still, it's a large program with many effects available to users only after a lot of experimentation. (This is, of course, true of any musical instrument.)

Playing with *Studio Session* was some of the best fun I've had in a long time. I highly recommend this program as an entertainment, composition, and educational tool. It's also great for a laugh. *–Ken Goebner.*

See *Where to Buy* for product details.

Macro-Making for the Mac

***AutoMac II** 2.0*

Macro program. ***Pros:*** *Easy to create macros; macros can move between applications.* ***Cons:*** *Disables ⌘-key combinations in some programs.* ***List price:*** *Version 2.0.9 $49.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

A macro is a command sequence that executes a series of repetitive, intricate, or lengthy responses. You can use them to create glossaries, execute batch files, manipulate windows, set up presentations, and even create limited animations. The possibilities seem endless. Macros, in fact, offer so much potential for increased functionality that you may wonder why Apple doesn't include a macro capability in the Macintosh System file. But it doesn't and that's where *AutoMac II* comes in.

The Hands-off Approach

AutoMac II is a macro-generating program that installs automatically in memory (using only 15K) and resides there alongside whatever else you happen to be running. To generate macros using *AutoMac II,* first enter the Option-Backspace command. This calls up the dialog screen (see "The Recording Box"). Enter the key you want to control the macro you're about to create. Click Record. That's it. Perform the action you want to be turned into a macro exactly as you want it to be done. When you're finished, press Option-Backspace again. Your first macro has been created.

How It Works

All *AutoMac II* does is record mouse movements and keystrokes exactly as performed, either as a simple event sequence or in real time. Whatever you do, in the order you do it, becomes the blueprint for the resulting macro. If you make a mistake while recording a macro, the macro will repeat the mistake every time, but don't worry, macros can easily be redone.

Generally, you'll record macros as event sequences. This means that the macro will execute the recorded events as fast as the Macintosh can respond, which is a lot faster than you can. Long, complex command sequences can be speeded up considerably, and switching from one format to another can be accomplished in seconds.

AutoMac II is also "immortal:" you won't purge it by switching programs, so you can create macros in one application and transfer them to another. After you've created the macros for one application and saved them as a set, they'll load automatically every time the application is used.

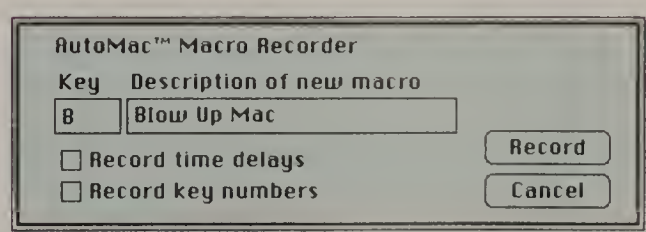
This brings up one qualification, however. *AutoMac II* records mouse movements and keystrokes independent of the environment in which they're running. For example, if you run a macro created for *MacWrite* while you're in *MacPaint,* the keystrokes and mouse movements will behave as though they were in *MacWrite.* The result will probably be meaningless. If your macro includes a lot of mouse movements, make sure not to alter the environment, or your macro won't behave as planned.

Macro Programs Compared

AutoMac II is not the only macro package for the Macintosh. Besides *Tempo,* there's also a macro utility called *Touch.n.Go,* included in Cortland's *TopDesk* DA collection.

Tempo offers more features than its competitors, including up to 24-hour delays and macro script editing. Since it's much larger than either *AutoMac II* or *Touch.n.Go,* it's better suited to hard disk systems. Still, *Tempo* is the only choice for creating fully automated presentations or programming functions to take place in your absence. *Tempo* installs as an extra desk accessory.

Touch.n.Go is a lightweight, by comparison, but comes on a disk with six other *TopDesk* DAs. Unlike *AutoMac, Touch.n.Go* is application-specific—its macros can't travel from one application to another. And since *Touch.n.Go* is a DA that must be installed with its own utility, if you have a full System file, you're out of luck.



The Recording Box
AutoMac II *provides a simple dialog box in which to enter the key code and description of your customized macro.*

AutoMac Recommended

Since it uses so little memory and offers mobile macros, I recommend *AutoMac* over the other programs mentioned. Because *AutoMac II* is memory resident, however, some programs that handle memory in nonstandard ways (many games, telecom programs, and *Word* 3.0) may not work properly. Programs that use a lot of ⌘-key equivalents also present problems. Fortunately, *AutoMac II* can easily be toggled on and off.

The *AutoMac II* disk contains a set of *MacWrite* macros and a utility for customizing ⌘-key choices, and its highly readable manual is packed with information. *AutoMac II* is easy to use, reliable, and powerful. It's the kind of program you don't realize you need until you have it; then you can't imagine being without it.—*Eric Baldwin*

See *Where to Buy* for product details.

Baby Talk

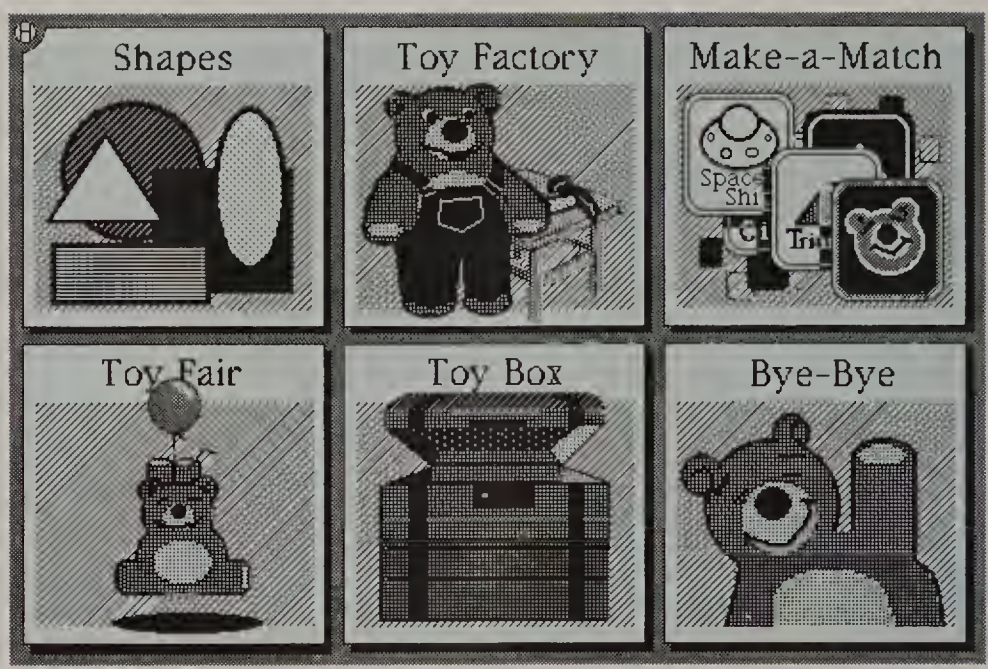
***First Shapes** 1.0*

Children's educational game. ***Pros:*** *Easy for young children to understand and use; entertaining graphics and speech; variety of games.* ***Cons:*** *Expensive compared with non-computerized games that teach similar concepts.* ***List price:*** *$49.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

***MacRobots** 1.0*

Children's educational game. ***Pros:*** *Easy for young children to understand and use with minimal adult help; entertaining graphics and speech; variety of games.* ***Cons:*** *Games cannot be customized to meet individual child's needs.* ***List price:*** *$49.95* ***Requires:*** *128K.* ***Copy protection:*** *Key disk.*

Designing educational software for preschoolers isn't easy. A child who can't read obviously won't learn to use a program by studying a manual, so programmers have had to develop new ways to convey concepts and instructions to nonreaders—without depending on parents and teachers.



First Shapes Picture Menu
The child can choose any of the six pictures; the small H in the upper left corner opens a customizing screen for use by parents or teachers.

One obvious solution is the use of icons. Picture menus make sense to kids, who quickly learn to point and click the mouse. But for conveying instructions and asking questions, icons are no substitute for the spoken word. This is where speech synthesis software comes in. It allows the Mac to speak in plain, if somewhat mechanical, English. First Byte's *SmoothTalker,* which has been incorporated into several educational programs, set the stage by allowing the computer to interact in an entertaining way with kids who haven't yet learned how to read.

First Shapes

To teach the basics of preschool geometry, First Byte has developed *First Shapes,* which incorporates *SmoothTalker* speech synthesis. After an introduction from the robot-voiced Ted E. Bear, a picture menu offers five different game options (see "First Shapes Picture Menu"), from the simple Shapes to the challenging Make-a-Match.

Shapes provides an introduction to the five shapes (square, circle, triangle, rectangle, and oval) that the child will use in the other program modules. The Toy Factory teaches children to build customized dolls, trucks, robots, and other toys by choosing shapes for each part of each toy. Toy Fair is a simple drill-and-practice game: the child selects shapes in response to verbal requests. And Make-a-Match allows players to flip cards in pairs, looking for matching shapes and pictures.

Children are not penalized for wrong answers, and a Helper menu option allows parents or teachers to customize the program with personal names, messages, and other options. The manual that accompanies the program is useful, with lots of tips for maximizing the educational benefits of *First Shapes.*

MacRobots

Unicorn Software's *MacRobots,* an educational smorgasbord for preschoolers, also uses the *SmoothTalker* speech synthesizer. Like *First Shapes, MacRobots* provides easy access to several simple games via a picture menu (the child may also use pull-down menus or the keyboard to select options).

In Robot Story, the computer recites verses from a modernized nursery rhyme, illustrating each verse with an animated scene and allowing the child to type the correct number to finish the verse: "Ten little robots all in a line, I strolled away and then there were...How many?" Count the Robots is a simple counting game with graphic rewards and hints after answers. Robot Addition introduces addition with a similar game. Letter Match familiarizes children with letter shapes and the keyboard layout by asking them to locate and type letters to match the screen display. Finally, Robot Construction (a sort of computerized version of Mr. Potato Head) allows the child to select body parts to create a variety of unusual fantasy robots. It's not as fancy as *First Shapes'* Toy Factory, but younger kids still enjoy it.

Educational Objectives

Both of these programs were clearly kid-tested by their designers. Both use icons, picture menus, and speech so effectively that a typical nonreading child can

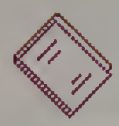
learn to use them with just a little initial guidance from an older helper. They're also entertaining enough that most young children will enjoy playing them for long periods at a time. While noncomputer preschool games offer the same benefits with less cost, these programs do provide kids with tools for developing skills necessary for learning to read and think logically. And probably just as important is the fact that they provide a way for children to become more comfortable when interacting with the computer itself.–*George Beekman*

See *Where to Buy* for product details.

It Only Hurts When I Stop Laughing

Bureaucracy

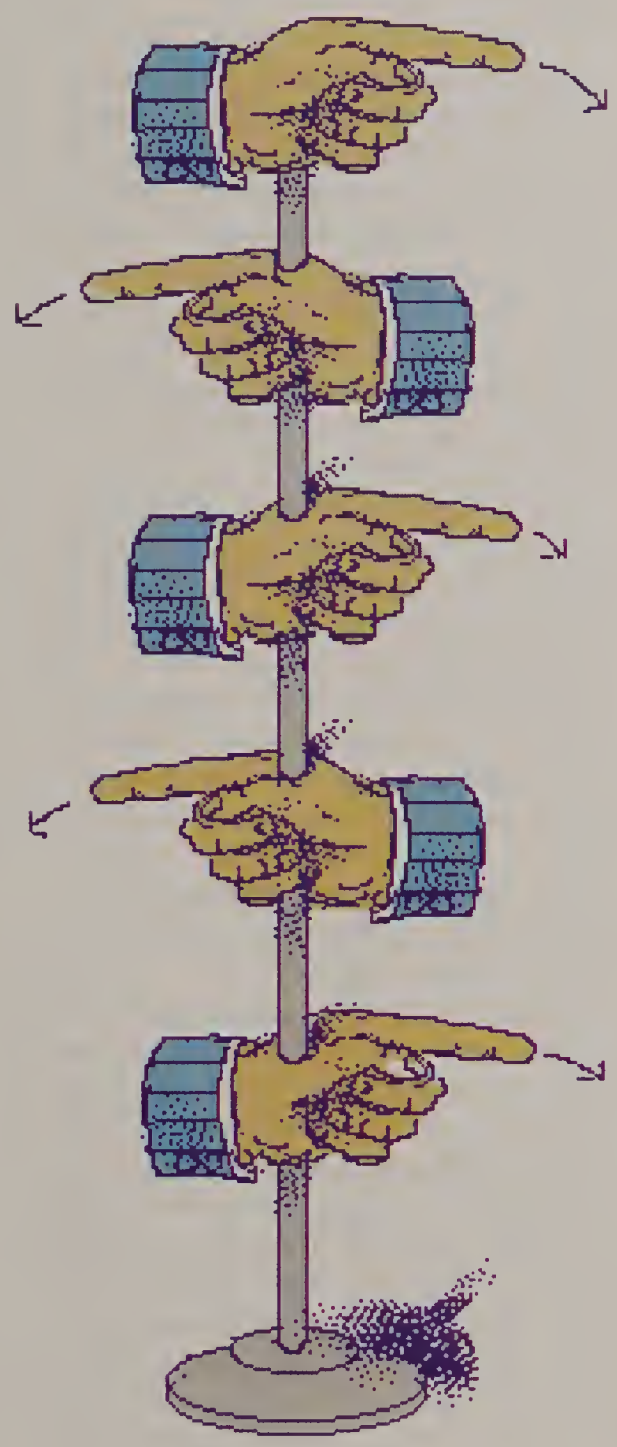
Interactive fiction (intermediate level). ***Pros:*** *A highly entertaining exercise in frustration.* ***Cons:*** *Prolonged exposure could cause high blood pressure.* ***List price:*** *$39.95.* ***Requires:*** *512K.* ***Copy protection:*** *None.*



Bureaucracy. The word alone is enough to bring some people to their knees. When Douglas Adams, author of *The Hitchhiker's Guide to the Galaxy*, ran afoul of the English postal and banking systems, he decided to exact revenge. Drawing on his experiences and his own unique view of the human comedy, he created *Bureaucracy*, the latest of the madcap text misadventures from Infocom.

Pack Up Your Troubles ...

Things start out innocently enough. You have just moved into town to start a new job with the Happitec Corporation. Your furniture has been lost in transit somewhere, but that's OK–Happitec is sending you to Paris for a week of training and vacation. You leave this afternoon. Funny thing though, your plane ticket is at the airport and you have no way of getting there. To make things even more interesting, you have no money, your credit cards have been canceled, and your bank has sent your change-of-address form to the wrong place and won't let you access your account until the form is properly filed. As you explore your new neighborhood for clues to a way out, you encounter a cast that includes llamas, shotgun-packing grandmas, nerd hackers, and a host of others. This is before you get to the airport, where things start getting unusual.



... and Smile, Smile, Smile

Bureaucracy will make you laugh, cry, curse, pull out your hair, and scream like a banshee. Although it is probably the most enjoyable exercise in frustration on the market, I can't recommend *Bureaucracy* to first-time text-adventure players unless they are avid Douglas Adams fans. But the experienced player will not want to miss this game.–*Ken Goebner*

See *Where to Buy* for product details.

Mac-Mainframe Solution

pcLink *3.9*

Terminal emulator. ***Pros:*** *Versatile terminal emulation; command-scripting capability; powerful Macintosh-to-VAX integration software for serial and Ethernet connections.* ***Cons:*** *None.* ***List price:*** *$2000 for 5 users, $5000 for 20, $10,000 for 50, $15,000 for 100, $25,000 for 250, $37,500 for 500.* ***Requires:*** *512K.* ***Copy protection:*** *None.*

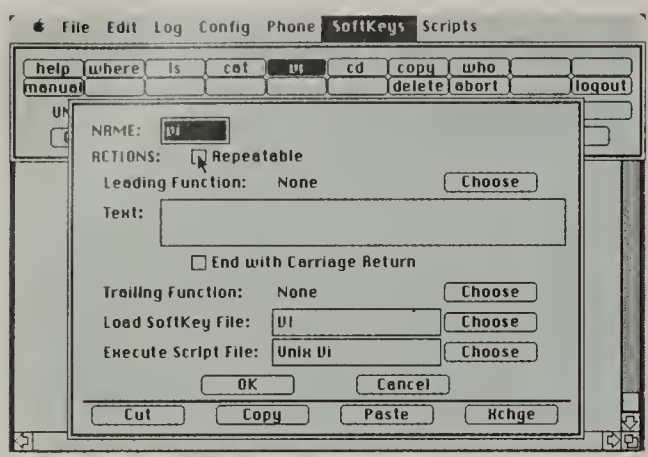
Pacer Software's *pcLink* is more than a terminal emulation program. It's a powerful integrated mainframe telecommunications product that brings ease of use to both casual and power users. *pcLink* supports both asynchronous (RS-232C, up to 38,400 baud) and Ethernet communication protocols; it emulates six popular terminal types, including VT220, VT100, and Televideo 950. *pcLink* stands on equal footing with many popular telecommunications programs, thanks to its programmable function keys, its powerful script language (including Macintosh-like interface features), its session log files, and its ability to browse or print Macintosh text files without quitting.

pcLink's most important feature is the integrated Macintosh-to-mainframe communication environment it provides. The server software offers file transfer, virtual Macintosh disks, print spooling, and high-speed Ethernet connectivity. These features give heavy users high-performance VT100 emulation along with Ethernet connectivity; casual users will appreciate the ease with which they can access VMS and UNIX mainframe applications.

Customizing Your Terminal

To simplify lengthy keystroke commands, *pcLink* provides 20 mouse-activated soft keys (on-screen function keys). The definition for each soft key (see "Defining a Soft Key") can consist of any or all of the following: a nontext leading command (for instance, to clear the *pcLink* screen or move the cursor), a string of text (the host command), a nontext trailing command, the name of a disk file containing a set of soft-key definitions to load, or the name of a disk file containing a script file to execute.

pcLink also provides a powerful scripting language for creating advanced



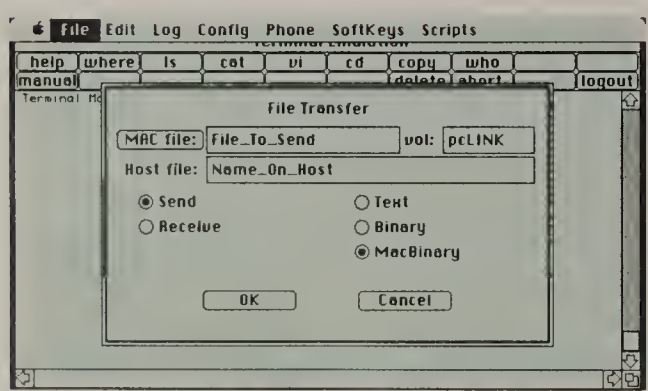
Defining a Soft Key
pcLink *uses this dialog to define soft keys. The example here is designed to invoke the UNIX editor* vi. *This definition loads a separate set of soft-key definitions specific to* vi, *and then executes a script file named Unix Vi, whose contents are listed in the article.*

macros and turnkey user interfaces to mainframe software applications. For example, here is a script to invoke the UNIX editor *vi:*

```
select("Choose a File to Edit",
"ls -1\r", "ls -1", "[", "vi ");
aputs("");
```

The select() procedure produces a dialog resembling the standard file dialog (SFGetFile) with a list of files in the current directory on a UNIX host. If one of the files is chosen, the select() procedure generates a command line to start *vi* with the file chosen by the user. The aputs() subroutine simply adds a carriage return to complete the command line.

Using scripts such as this one, you can incorporate some of the familiar user-interface features of the Macintosh into mainframe applications. Script files can be written with a text editor or recorded automatically from a series of user actions. Script commands are available for changing communication settings, dialing or hanging up the phone/modem, file transfer (including host-initiated transfers), print spooling, prompting for input with Macintosh dialogs, and programmable time delays.



File Transfer with pcLink
Setting up a file transfer with pcLink *is as easy as it looks. Hit the button labeled MAC file. To select a file, you enter the host file name, select the transfer type and direction, and off you go. A view of* pcLink's *20 programmable soft keys appears in the main window just below the title bar. The soft keys shown here contain some common UNIX commands.*

Mainframe Communications

Pacer preconfigures the mainframe server portion of the *pcLink* software for your specific mainframe and operating system, making for easy installation. Following the clearly written installation instructions, I completed the whole process in less than 15 minutes on a Pyramid UNIX system. *pcLink* terminal software is also available for the IBM PC and the DEC Rainbow.

The *pcLink* server/terminal combination supports text, binary, and MacBinary file transfers. You can easily initiate all file transfers through a single dialog (see "File Transfer with pcLink"). A menu selection also allows the terminal software to respond to file-transfer requests from the mainframe. These three types of file transfers will be sufficient for most users. Nevertheless, I found myself wishing that *pcLink* also included MacXModem, the transfer method frequently used by Mac owners running UNIX.

pcLink supports communication over Ethernet networks via Kinetics' FastPath (AppleTalk/Ethernet) or a SCSI/Ethernet connection. I tried out the Ethernet connection with the Pyramid version of the *pcLink* UNIX server and the FastPath gateway. The *pcLink* Ethernet software installation was straightforward and well documented, but the FastPath installation required some guidance from the local UNIX guru. Once we got connected over Ethernet, communications were blindingly fast.

pcLink lets you create virtual Mac disks in the host machine's file space—an advantage if your Mac is running short of disk space. You create a virtual disk by designating disk space on the mainframe computer as one or more Macintosh disks. The virtual disk appears to your Macintosh just like any other disk, and you can access it from any Macintosh application. Remember that for a virtual disk, access speed is limited by communication speed, so you must be connected at a minimum of 9600 baud or you must be using an Ethernet connection.

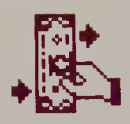
pcLink's unique combination of terminal emulation, integrated mainframe software, and Ethernet support make it an excellent product for mainframe computer users. I highly recommend *pcLink* for mainframe users with business and scientific applications. For serious programmers and code developers who don't need the integrated software capabilities, the Ethernet support alone makes *pcLink* well worth looking into.—*Dave Burnard*

See *Where to Buy* for product details.

Move Over, Dollars and Sense

In-House Accountant *1.0*

Financial management package.
Pros: *Easy to learn and use; clear documentation with many examples; good functionality.*
Cons: *$1 million limit; requires preprinted forms for invoices and statements.* ***List price:*** *$149.*
Requires: *512K.* ***Copy protection:*** *None.*

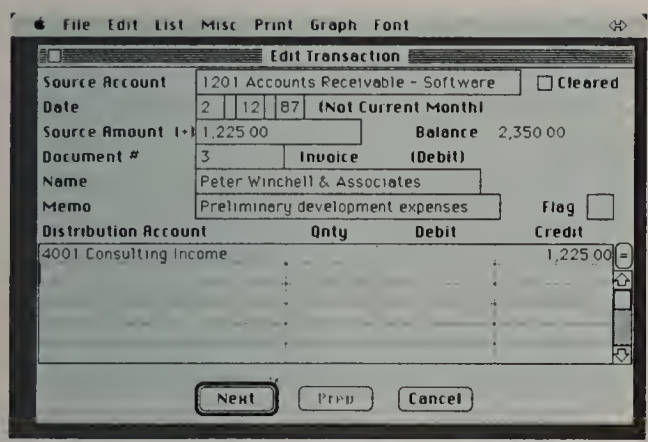


Personal financial management and small-business accounting are not all that different. Monogram's *Dollars and Sense* is probably the most popular financial management program for the Mac. In fact, many of its users are small-business owners.

Migent has capitalized on that overlap in its new Mac product called *In-House Accountant*. The program has so many features that it compares favorably with programs classified as accounting software, but its simplicity makes it an excellent choice for personal use as well.

Integrated Functions

In-House Accountant offers general ledger, accounts payable, and accounts receivable functions, and includes some minor inventory capabilities as well. These three functions are integrated into a single program that does not actually differentiate between them. Instead, you have accounts, names, and transactions. Names can refer to customers or vendors, if you're using the program for a business—or the name you write on your checks, if it's for personal use.



Edit Transaction Window
Each transaction you enter in In-House Accountant's *Edit Transaction window can have up to 50 distribution accounts. If you select the invoicing features, you can enter item quantities for printing on invoices.*

If you have checking account transactions that include names, *In-House Accountant* assumes that you're either receiving or writing a check, and it keeps track of that name's balance. The program makes similar assumptions for accounts you've labeled as receivables and payables. You can print computer-generated checks, invoices, and statements for any named entity. Overall, the organization of the program makes it well suited for both home and business users.

You can enter up to 500 four-digit accounts with *In-House Accountant*. For each one, the program tracks monthly balances for the previous and current year, monthly budget amounts, and year-to-date amounts. If you select the invoicing feature when setting up the program, you can track unit counts for an account and enter a unit price that is automatically used to calculate the total amount if you specify a quantity for a transaction line.

Transactions and Reports

All *In-House Accountant* transactions are entered through the same window (see "Edit Transaction Window"). You specify one source account and up to 50 distribution accounts for each transaction. Depending on the source account code and whether the source amount is positive or negative, *In-House Accountant* determines the type of transaction and displays it underneath the source amount. If you enter a name that's not already on the names list, the program will automatically add it to that list. Transaction data-entry couldn't be much easier.

The program has a variety of other features, including single-level password protection. You can reconcile an account to your bank statement and enter transactions for all 12 months of the year, as well as view transactions from the previous year. The program readily handles more than one business or household. You can create a batch of either automatic or recurring items for handling repetitive transactions. Recurring transactions can be modified before posting, though automatic transactions cannot. The program includes a set of 18 functions that let you calculate some common financial amounts, including depreciation and loan calculations.

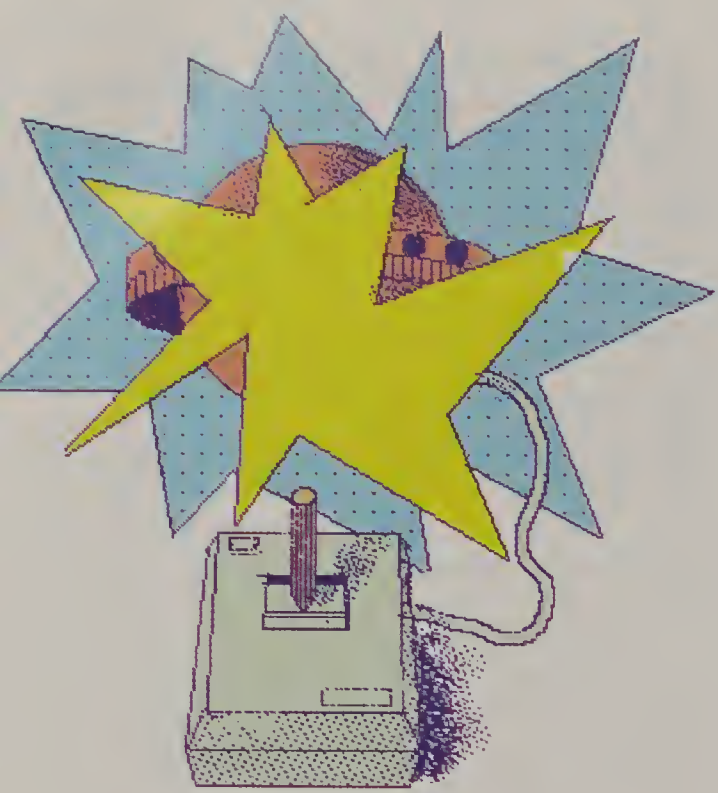
One of the program's strengths is its reporting capability. It generates a good set of financial reports—income statement, balance sheet, trial balance, general ledger, journal listing, an aging report, and so on. In addition, you can create a variety of transaction subset reports by using account, date, and document-number ranges and other selection criteria. These options can be used to create detailed receivables and payables lists, a cash receipts journal, and a variety of other important financial reports. *In-House Accountant* also includes pie-chart and bar-graph commands for graphical account analysis.

There are a few things *In-House Accountant* won't do. Unable to distinguish between open-item and balance-forward customers, it automatically assumes all are balance forward. It can handle neither individual amounts nor account balances greater than $999,999.99, which could be a problem for some potential business users.

I found some other minor flaws in the program. First, it labels miscellaneous income and expenses as extraordinary items on the income statement. The word *extraordinary* has a specific meaning in accounting terminology, and it doesn't refer to miscellaneous items. Second, the reference section of the documentation is ridiculous. It consists of a series of one- or two-sentence descriptions for each menu command. All the important information is found in other sections of the manual, which are basically well written, clear, and detailed, with lots of examples. Third, you'll have to order special forms if you want to print invoices or statements. The program should have plain-paper options for those types of output. Finally none of the program's limitations are mentioned either on the packaging or in the manual's introductory section.

Overall, though, *In-House Accountant* is a very good program. Migent has packed a remarkable amount of functionality into a simple, easy-to-use program, which it's selling at a competitive price. The program is particularly appropriate for individuals but has some feature limitations that may not make it suitable for all businesses. It should give *Dollars and Sense,* and some of the dedicated small-business accounting products, a run for their money.—*Steve Mann*

See *Where to Buy* for product details.



Shareware and Public Domain Game Awards

Here are my choices for the best public domain and shareware games. The following unofficial awards were given for excellence in software design and implementation, creativity, playability, and humor. Sometimes logical and sometimes arbitrary, these categories are not intended to be taken too seriously.

While public domain and shareware utility programs like *Packit* and *Xmodem* have enhanced our productivity, other such programs have given us respite from the trials and tribulations of everyday life. These games can be found on major bulletin-board systems like GEnie, CompuServe, and Delphi; they're also available from user groups.

Best Arcade Game: *Timeout* is a desk accessory version of the popular Breakout game. Although the game itself is simple, its accessibility from within other applications makes it the ideal diversion when you want to take a break.

Timeout offers 15 speeds–from tooo slooow to sofastyoumightaswellforgetit. You determine how long each game lasts, but when time runs out, the game ends. The idea, of course, is to achieve faster and faster times.

Another excellent Breakout game is *Brickles,* a program with wonderful features that most *Timeout* fans should enjoy. Honorable mentions go to *Brickles, MacBugs,* and *Ashes.*

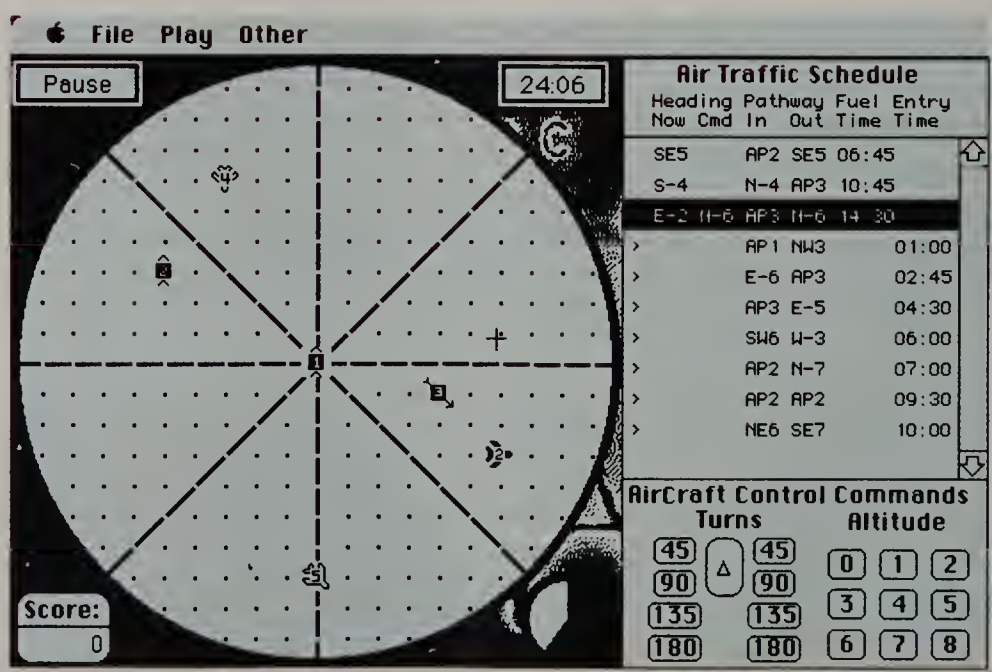
Best Implementation of Rogue and 2-D Maze Game: *The Dungeon of Doom* is an adaptation of the well-known game Rogue. In *The Dungeon of Doom,* you control a small character in a large multilevel maze. Various monsters try to impede your progress, while you collect weapons, gold, food, and other surprises. Played entirely with the mouse, the game features well-drawn, amusing graphics. As you explore each maze level, your path is traced to create a small (but potentially useful) map. Since *The Dungeon of Doom* is a magical realm, a variety of oddities like potions, scrolls, and rings can yield positive or negative effects. Experimenting with these magical objects should appeal to Russian roulette fans.

Best Egyptian Adventure and 3-D Maze: *The Scarab of Ra* is a nifty maze game that places you in the role of an archaeologist who has fallen into the inner chambers of the fabled Great Pyramid of Ra. To escape, you must explore increasingly complex maze levels, locate three sacred relics, and find a door to the outside. The game is graphically appealing because of its excellent design, its use of perspective, its detailed monsters, and its real hieroglyphics written on the walls. Although it is pretty easy to complete, *The Scarab of Ra* is thoroughly enjoyable and exhibits a fine sense of humor.

Best Motion Study: *Billiard Parlor* is loaded with special effects. Written in Reed College's Rascal programming language, *Billiard Parlor* offers several pool games, including billiards, eight ball, and rotation. The mouse serves as your pool cue, and you drag it away from the cue ball to aim and set the force of the shot. You can also set the English on the ball by selecting the exact spot of impact. Other features include instant replay, saved shots, FatBits, and trails behind the balls to illustrate their paths. Ball movement is very realistic, and excellent sound effects add to the fun. *Billiard Parlor* is a must for pool fans.

Best Candidate for a Coronary: *Air Traffic Controller* is for the strong, the quick-minded, and the patient. Simulating the job of a real air traffic controller, this game can have you handling up to 5 airports and up to 150 planes. Even at the minimum configuration (1 airport, 5 planes), this program will challenge you. You must order each inbound plane to its proper approach path while avoiding near-misses. One collision or a landing off the runway, and the game is over. Outbound planes must be safely sent on their way without mishap. Options include settings for allowable altitude and distance (before a near-miss is recorded), length of shift, and number of planes and airports (see "Best Candidate for a Coronary").

As in the real world of air traffic con-



Best Candidate for a Coronary
The Air Traffic Schedule shows you a plane's current position, the controller's instruction, the plane's point of origin, required destination, and the amount of time remaining before running out of fuel or before the scheduled departure or arrival time.

trol, you must anticipate and plan ahead. *Air Traffic Controller* has a dedicated, if slightly masochistic, following. No one I know of can handle the maximum number of planes and airports successfully, so I highly recommend *Air Traffic Controller* for those who seek an ongoing challenge.

Best *World Builder* Game: Silicon Beach's *World Builder* game-development system has spawned a whole breed of games on bulletin boards. These games range from fairly professional stories to clever, creative efforts by kids and teenagers. *Deep Angst* pokes fun at the whole process. It's an entertaining–if somewhat cynical–send-up of the whole genre of graphic adventure games. Highly recommended for those with a sense of humor. Honorable mentions go to *Death Mall 3000, Radical Castle, T-Rex,* and *Edg's World.*

Best of Show: *Cap'n Magneto* is my favorite shareware game. It contains all the important elements–good graphics and animation; unique and effective user interface; interesting, offbeat plot; puzzles; humor; a major goal; and several minor goals. And it even talks (512K required) via *Macintalk*. Cap'n Lance Magneto is a member of the Intergalactic Rangers–whose mission is to recover the stolen Crown of Control, defeat the evil Menturg, repair a broken spaceship, and finally lift off. Although *Cap'n Magneto* resembles other games with its emphasis on fighting and destroying enemies, it requires strategy to win. Moreover, making friends is at least as important as fighting, which sets *Cap'n Magneto* apart from the rest.

Cap'n Magneto successfully combines arcadelike features with the puzzle-solving spirit of a good adventure game. It's all infused with an irreverent sense of humor that makes even the frequent shareware "pitches" enjoyable (at least for a while).

Of the hundreds of public domain and shareware games in circulation, some are not worth the downloading time. Nevertheless, most of them represent many months of work, and they enrich our lives by providing a creative exchange not bound by commercial restraints.

My thanks to Steve Costa of BMUG and to the users of GEnie who responded to my poll.–*Rusel DeMaria*

See *Where to Buy* for product details.

On Time

***Time Logger** 2.11*

Time tracker. ***Pros:*** *Easy to use; easy to read and access records; AutoRun and manual operation; versatile default options; calculates hourly fees; inexpensive.* ***Cons:*** *Must be manually set to track some games, desk accessories, and utilities.* ***List price:*** *Shareware $15; site licenses available.* ***Requires:*** *512KE.* ***Copy protection:*** *None.*

When clients, the IRS, and others ask what you do with your Mac, *Time Logger* can provide a painless answer by automatically recording the time you spend in each application. For more detailed information, you can indicate in a dialog box precisely what you're doing each time you open or close any application (including the Finder), and each time you shut down or start up your Mac. The program also lets you calculate your online time, so you can separate business from leisure time, track client bills (*Time Logger* can calculate fees based on hourly rates), and log phone calls. For report purposes, *Time Logger* produces tab-delimited text files, which are readable by most databases, spreadsheets, and word processors.

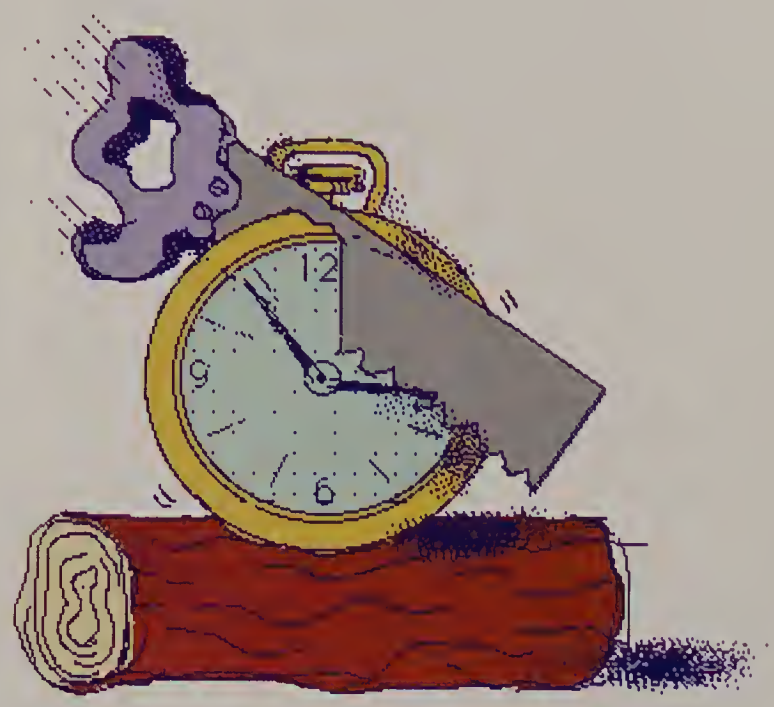
Like most desk accessories, *Time Logger* is simple to install with Apple's Font/DA Mover. If you want to set AutoRun for startup and shutdown, drag the *Time Logger* Init into your System Folder. If you prefer keyboard controls to the mouse, then install the *Time Logger* F-key with Apple's *ResEdit* or Carlos Weber's *FKey Manager*.

Time Logger lets you record various kinds of information in the Logger Files: client name, client code, comments, date work started, time work started, time work stopped, number of minutes worked (takes into account time-out periods), billing (your rate multiplied by the time logged on; if this amount is less than the minimum charge you've specified, your minimum is used). Since *Time Logger* lets you maintain several Logger Files, you can organize records any way you want. Unlike other time-usage programs, it lets you keep the files in different folders and on separate disks.

You'll find *Time Logger*'s files easy to access and read. Double-clicking on a Logger File will open the document in *MacWrite*. Or you can launch *Excel* and then select the Logger File. In fact, any program that can read text files should be able to read the Logger File without forcing you to put the application and the file in the same folder.

The Manual Advantage

The AutoRun mode won't disturb you as it records the amount of time you spend within an application. You can choose to record additional information in a dialog box upon entering and leaving an application. If you want specific entries but don't want to log everything you do, manual operation is faster than AutoRun. You can call *Time Logger* at any time to close, open, or



alter the information it is recording. If, for example, you want to remain in an application, but have completed work for one client and are about to begin work for another, simply invoke the *Time Logger* dialog box and record the change. By selecting *Time Logger* with the Option key depressed, you can change your default fields and settings and even the file in which you want to store the record. You can also track the games, utilities, or other DAs that you can't record with the AutoRun feature. To record what you're doing, you can close or time-out *Time Logger* whenever you want.

Time Logger 2.11 has several advantages and no disadvantages when compared with a similar product, SoftView's *MacInUse* 1.0 (see "Tracking Mac Usage," *Reviews, Macworld,* July 1987). Unlike *Time Logger, MacInUse* cannot keep more than one log file on one disk, and it does not record time in the Finder. *MacInUse*

lets you write to the file only when you leave an application, so if you're working with more than one client in the same application, you must quit the application before going on to the next client. Also, reading the log files and transferring them into your spreadsheet or word processor is cumbersome, since the log file, templates, and the application you want to use must all be in one folder or on the desktop level.

Time Logger, with its comprehensive documentation, is an outstanding bargain at $15. The author, Loftus E. Becker, Jr., conscientiously supports and frequently updates the program. If you have any reason to record or report how you spend your time on the Mac, I recommend the versatile *Time Logger* over any other application. Its only drawback is that it does work, thereby confronting you with the evidence of how you *really* spend your time on the Mac.—*Linda Joan Kaplan*

See *Where to Buy* for product details.

Mouseballs

This noncomprehensive review comments on several mouse cleaning products, mouse pads and other mouse accessories.

Within a few years, computers have created a global industry, countless jobs, an infectious jargon and, arguably, a whole new way of perceiving the world. For any creation impacting so profoundly on human affairs, there must be an equally magnificent spawning of accessories.

Mouse Cleaning

Despite this reviewer's failure to ever notice such sticky substances in the atmosphere, the mouse appears capable of extracting something resembling tar from the very air we breathe. Ergotron's $16.95 Mouse Cleaner 360° is the first and only tool we have seen that can thoroughly clean the gummiest stuff off of mouse rollers in just a few seconds. You place its bristled scrubber ball in the mouse ball socket, then run the mouse in circles over a Velcro scrubber pad. Although it lacks an equally quick and effective way of cleaning mouse balls, Mouse Cleaner 360° is the only commercial system we'd recommend as a substitute for the old alcohol, blade, and Q-tip remedy.

Max the MouseDuster, available for $5.95 from Applied Elastomerics, is a sticky, stretchy, plastic blob of synthotech weirdness, shaped like a 3-inch gumdrop cat. When you completely enclose a mouse ball with Max every speck of grime adheres to it. This product also picks up undesirable loose stuff from mousepads, clothing, and virtually anything else. Max is soap-and-water washable, albeit in a slimy fashion. If you don't find Max's texture disgusting to begin with, and if you have a general lint problem, you will probably find Max the MouseDuster handy for one thing or another.

The Kensington Mouse Cleaning Kit with Pocket is impressively packaged to justify its $24.95 price tag. The kit contains foam-tipped swabs, a tiny bottle of cleaning solution, a tiny can of compressed air, and a mouse storage pocket in the style and color of the Macintosh. In our test, the recommended procedure failed to fully clean dirty mouse rollers.

We also found Tacklind's $14.95 Real Clean lacking as a mouse cleaner. Its thumb-forefinger rotation, socket-cleanser tool takes too much time to wear the goop off rollers, and seems messy when used with cleansing solution.

Mouse Pads

Mouspad by Moustrak, Inc. ($7.95 to $10.95) is very similar in quality and style to the Kensington's Mouseway pad, but we liked the softer Mouseway surface a little better for quick moves. At $9.95, the Mouseway is one of the most reasonably priced products we examined. Mouseway gray does not match the color of the Macintosh as the label claims; instead, it resembles the color of an IBM PC. Now, no need to hiss.

The most handsome mouse pad on a wooden computer desk might be the genuine leather Mouse-Hide from Pilot Enterprises, $15.00. After a few weeks of heavy use, though, it was already getting shiny spots where the mouse skipped.

Wheels and Paws

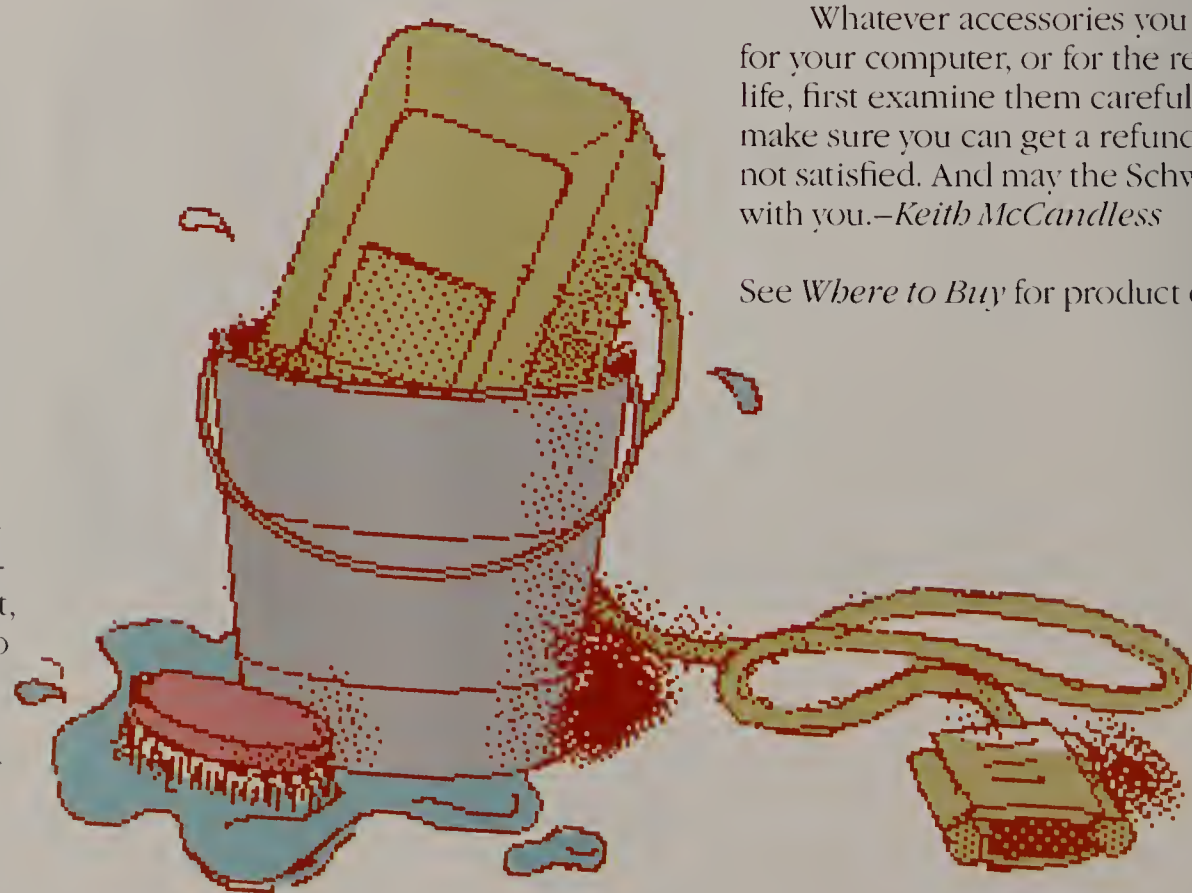
A mouse's nubby little feet (on either side of the serial number) will eventually wear out with use, and it will become wobbly. A couple of products provide solutions to this problem and are improvements over standard-issue mouse performance.

Mouse Mover by Magnum Software gets you rolling smoothly with three metal ball bearings in a plastic frame that is easily snapped on. Since the roller balls of the Mouse Mover itself will most likely become clogged with time, its $19.95 retail price seems a bit steep.

A mouse movement enhancer with no moving parts is Mouse Ease by Tacklind Design. For $2.95 you get four genuine mouse-size Teflon stick-on paws, similar to those now on new-model Apple mice, just the right thickness to provide optimal mouse ball surface contact. The nonstick properties of Teflon are best realized on hard surfaces, where movement is quick and easy.

Whatever accessories you purchase for your computer, or for the rest of your life, first examine them carefully, then make sure you can get a refund if you are not satisfied. And may the Schwartz be with you.—*Keith McCandless*

See *Where to Buy* for product details.



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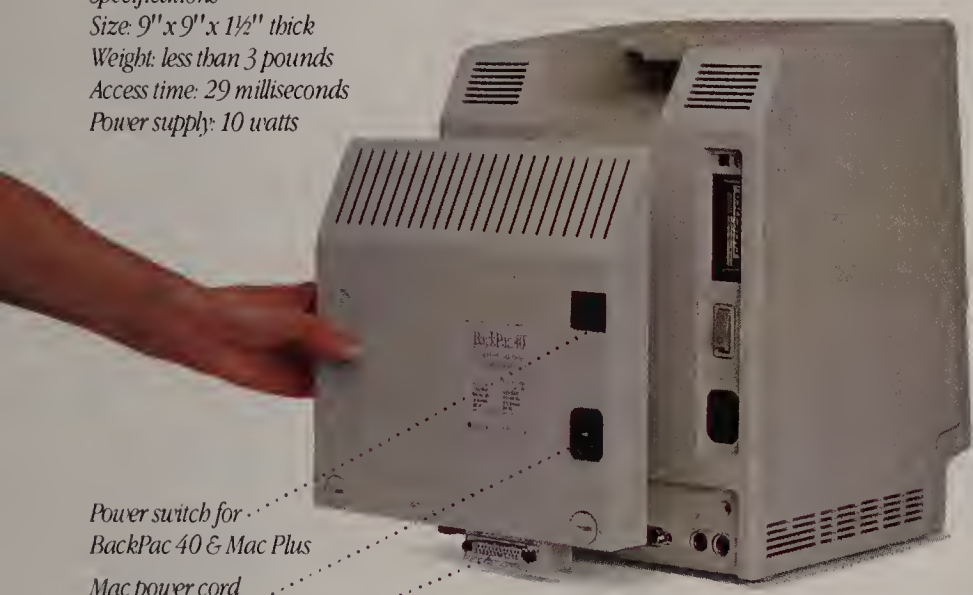

Power switch for BackPac 40 & Mac Plus

Mac power cord plugs in here

SCSI connector

Simple installation

1. *Remove Mac power cord.*
2. *Remove battery door and place in storage receptacle.*
3. *Remove 2 lower screws with tool provided. Place in storage receptacle.*
4. *Snap BackPac 40 and SCSI connector into place on Macintosh Plus.*
5. *Tighten BackPac 40 fasteners with coin.*
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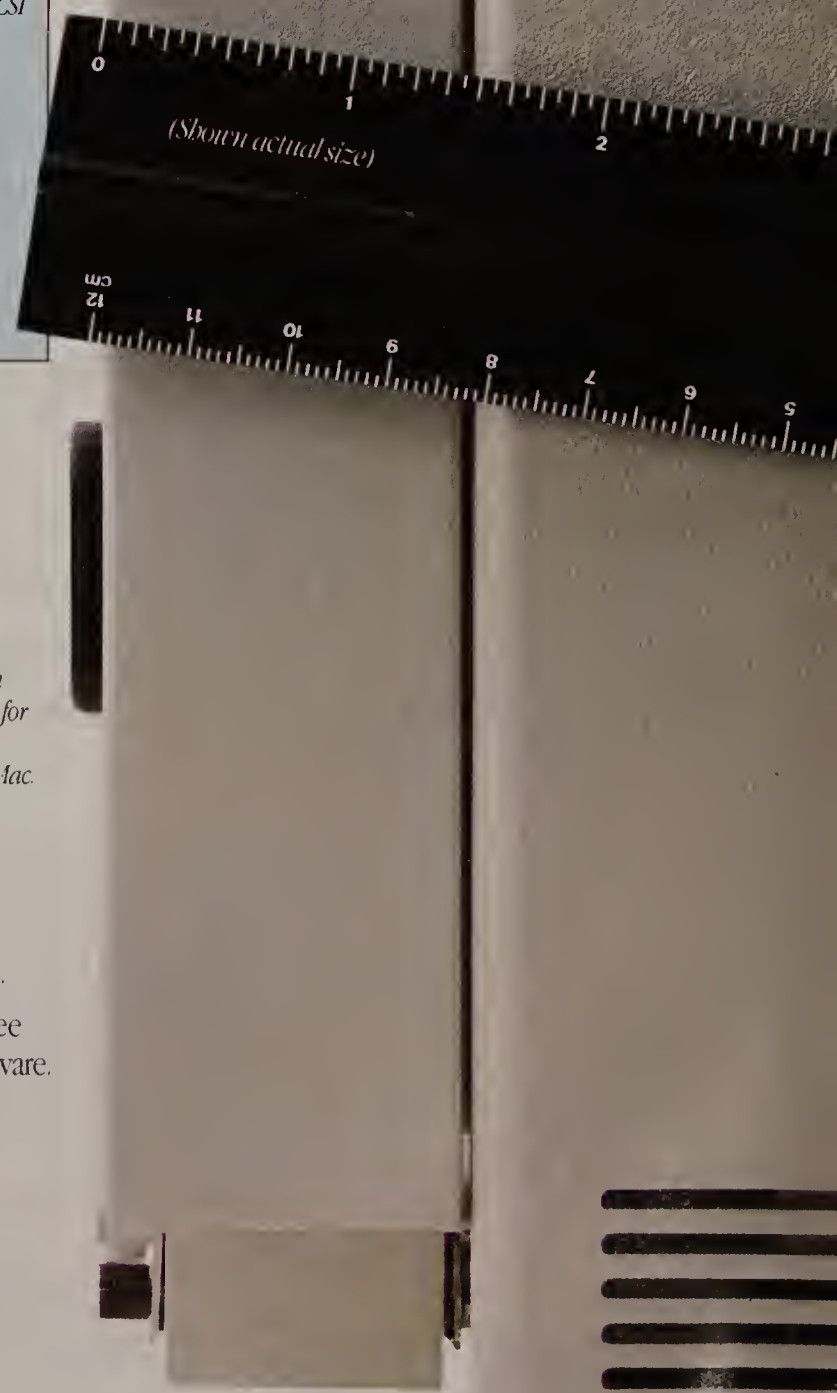

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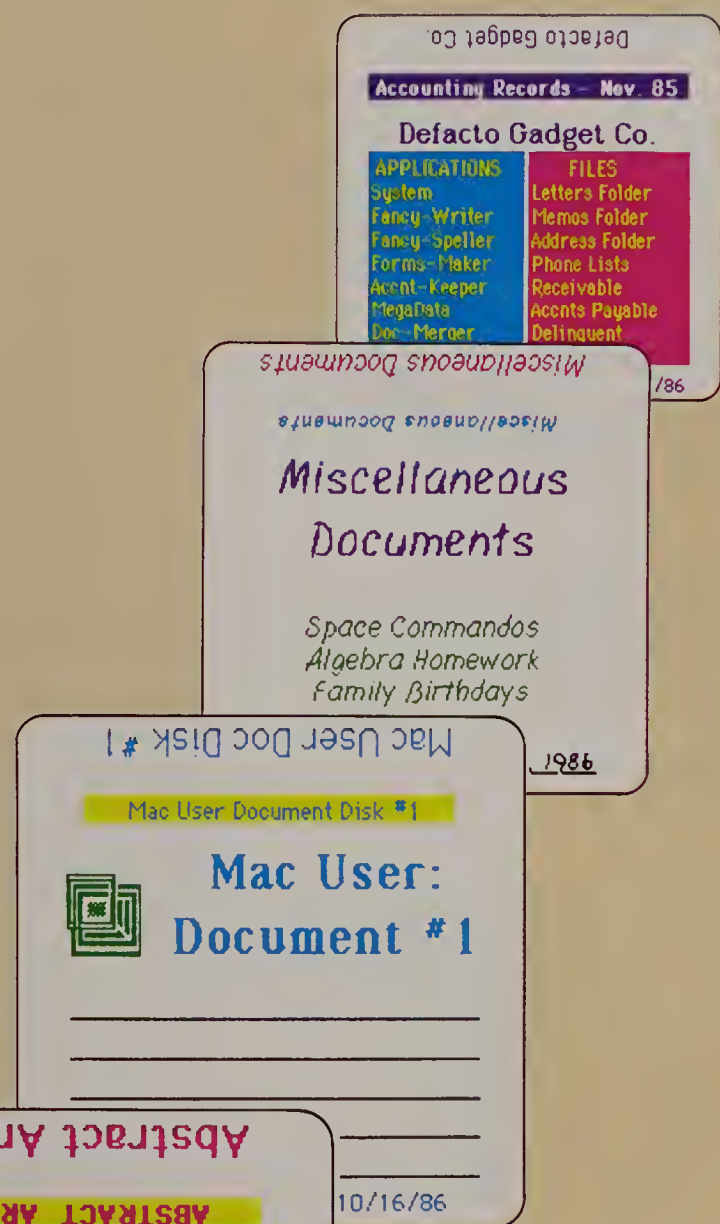

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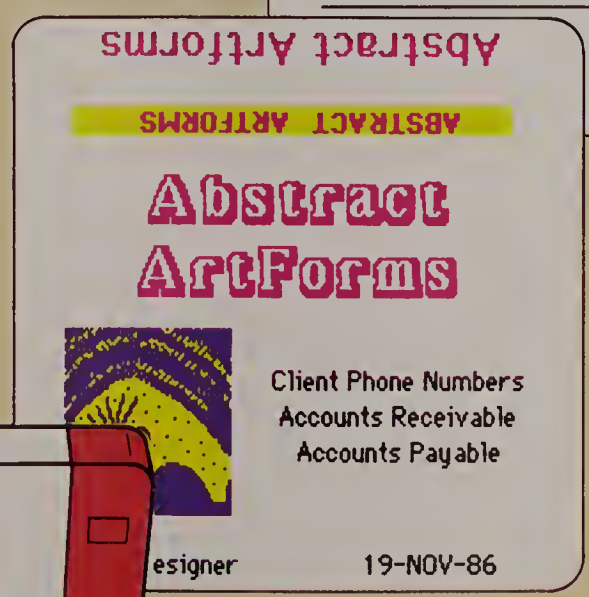

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Has that statistics package you thought was a tiger turned out to be something else?

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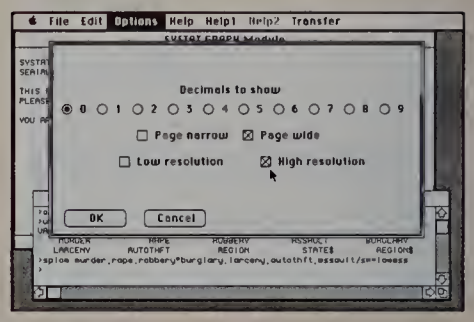

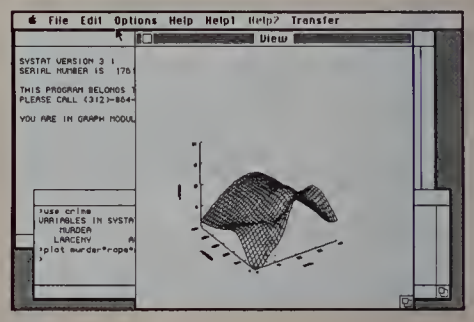

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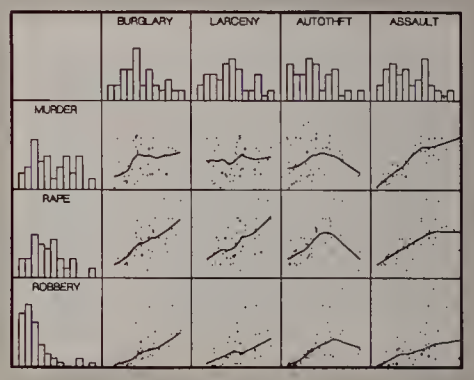

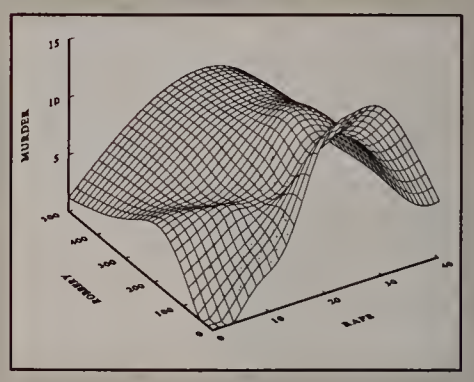

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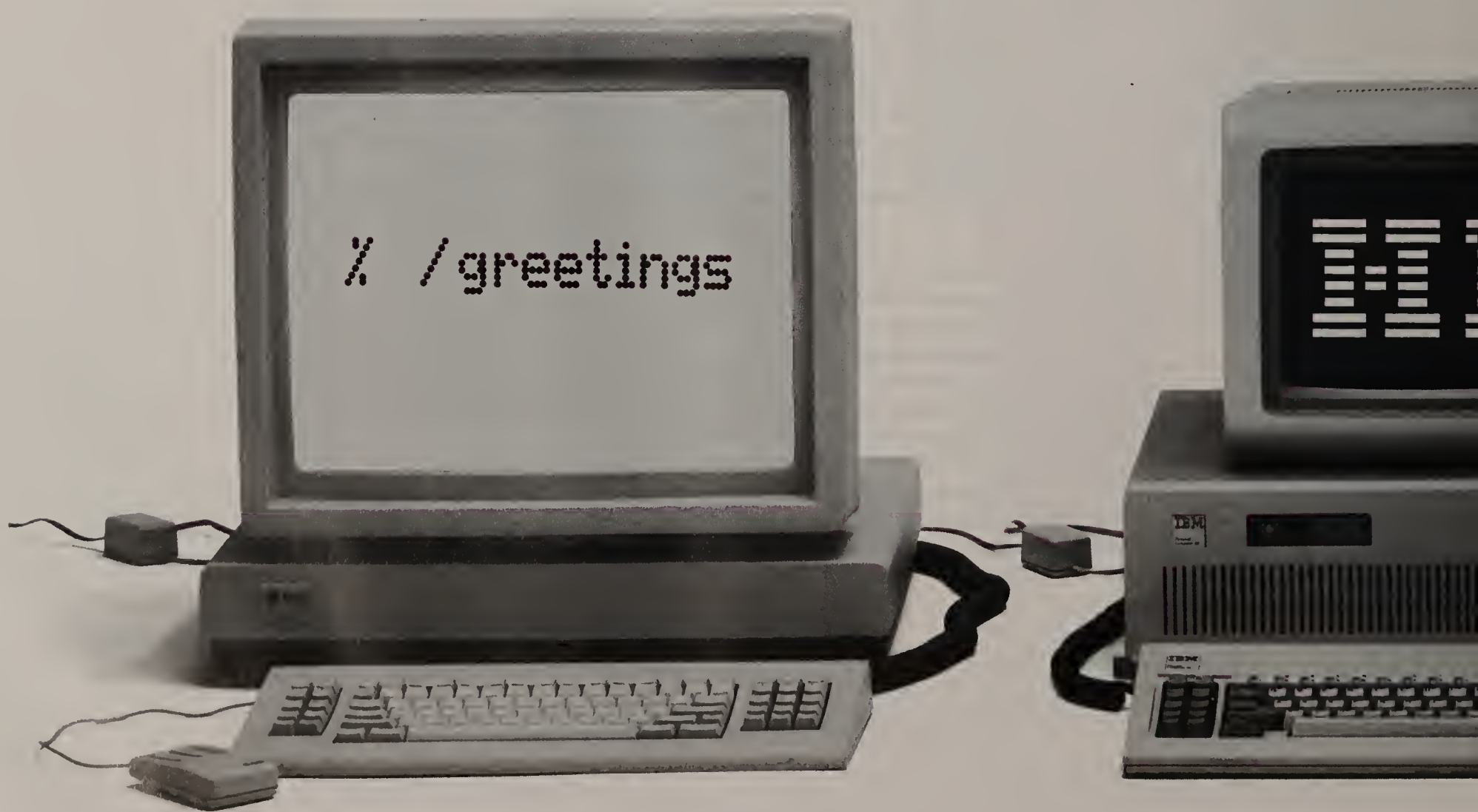

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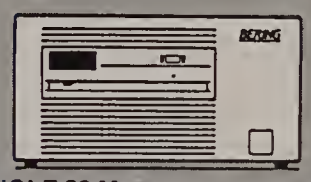

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BUSINESS BUYER'S GUIDE

This is the first *Macworld* Buyer's Guide, a listing of over 900 products. Since the world of Macintosh products now includes more than 3000 items and is constantly growing, we have chosen to provide an updated directory primarily for business and professional use. You will find here a wide range of business and professional products, including an array of over 50 accounting and spreadsheet programs; specialized programs for engineers, physicians, and real estate brokers; and all the elements of desktop publishing for professional and personal use. Also listed are graphics programs, communications software and hardware, storage items, systems and memory products, and every kind of input/output device. All categories include both software and hardware products to make your Macintosh a more wide-ranging and versatile tool.

Despite our best efforts, however, this guide isn't complete. It is intended to give you a very good idea of what the market offers at this time.

Product information was gathered directly from the manufacturers, and the prices given are those current at the time the information was collected. You should check each product with your dealer or the manufacturer before you buy to make certain it has the features you need and, most important, that it will run on your machine. No endorsement by *Macworld* is implied by this listing.

Note: Because many products fall into more than one category, please check a second or third category when looking for a certain product. (For instance, a design program for engineers may appear in the 2-D Graphics category or as an engineering item in the Professions category.) Also note that some manufacturers produce a series of products with minimal variations among them. Such series will be listed only once. An * in the Notes column indicates that a hard disk is recommended.

There are a number of other guides available for Macintosh users, most notably *The Macintosh Buyer's Guide, The MacGuide,* and *The Book of Macintosh Software.* CHA Services and The Public Domain Exchange are two of the many companies publishing programs in the public domain.

TAKE CHARGE PEOPLE CHOOSE C.A.T.

C.A.T. — The Powerful, New Relational Database for Managing Contacts, Activities and Time . . . Without Programming.

Successful business people hard-pressed to keep on top of their ever-growing list of contacts are finding C.A.T. is their most powerful and valuable personal productivity tool.

Just as success breeds success, so does success increasingly expand your contact network. And the more contacts you make, the more balls you must juggle at one time.

But C.A.T. puts you in control. It lets you categorize and group your contacts in an orderly manner reflecting the way you work and think. So you can manage them in more meaningful ways — and keep all the balls in the air at one time.

Before the amazing C.A.T. you could only design forms with a simple program that was unlikely to keep up with your future needs. Or you could program your own solutions — with much difficulty — using some rigid database.

But C.A.T. now lets you manage your contacts the common sense way — without programming.

Yet the sophisticated C.A.T. is so flexible it can be adapted to any business and so versatile it can be used in hundreds of ways, for example:

- Managing projects like new product introductions, promotions and meetings — C.A.T. tracks the status and details of each project.
- Doing mailings like invitations, form letters, newsletters and labels — C.A.T. files every mailing to each contact, activity and time.
- Recording day-to-day events — C.A.T. tracks trip planning, expense reporting, client management, personnel records, information requests, etc., etc., etc.

Take charge . . . with C.A.T. It lets you manage the quality as well as the quantity of information about your contacts.

C.A.T. is brought to you by Chang Labs, developer of the popular *Rags to Riches* integrated accounting system and applauded throughout the computer industry for our presale services and post-sales support.

Our team of business consultants is ready to answer your C.A.T. questions anytime — even before your make your choice. Give us a call at our toll-free number, describe your business and let our expert consultants match the right solution to your needs. Then any authorized Apple or C.A.T. dealer will help you put our suggestions to work.

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(in California Only: 800-831-8080)

Or send us your business card, and we'll mail you our free 6-page brochure.

Chang Laboratories, Inc.

5300 Stevens Creek
San Jose, CA 95129
408-246-8020

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Business and Finance

The proliferation of high-quality software for accounting, record keeping, financial analysis, and special reporting has helped the Macintosh make extensive inroads into business use. Whatever type of business you have, it's likely that, coupled with the right software, the Mac can make your workday simpler, more efficient, and more enjoyable. The following survey looks at the predominant categories of business needs.

Spreadsheets and Integrated Software

Spreadsheets and integrated products are second in popularity only to word processing software. If you take the time to learn a product and build appropriate templates, you can use one of these programs to automate just about any business or financial function. For complex calculation functions, you'll probably need all the spreadsheet power and speed you can get. For simpler uses, it makes sense to check out products that are easy to learn and use.

The hands-down leader in the high-end integrated software category is *Microsoft Excel;* with spreadsheet, graphics, and database capabilities, it is the standard by which others are judged. Lotus's *Jazz* has more features, including spreadsheet, graphics, database, word processing, and communications modules, though it cannot compete with *Excel* in power. For less complex needs, Microsoft has *Works,* a straightforward package that includes word processing, spreadsheet, database, communications, and graphics modules. Some users need no other program.

There are also good choices if you need only a spreadsheet. *MacCalc* handles large templates and has many of *Excel's* capabilities at a much lower price. *Trapeze* takes an untraditional approach—its templates are constructed as a collection of *blocks* rather than cells.

Once you've decided on plain or fancy, picking a specific product is a matter of personal choice. Try a few programs and buy the one that is easiest to use, most flexible, or that combines features you need.

Accounting

Accounting software is used for recording and reporting day-to-day business transactions. It must handle the different types of transactions that occur in business, record them accurately, and prepare the types of reports that help you run your business. Most accounting programs record information accurately, but they vary widely in the types of transactions they can handle and the types of reports they provide. For comprehensive accounting functions, you may have to make a substantial software in-

ILLUSTRATIONS BY SCOTT BALDWIN

vestment, though some inexpensive programs, like BPI's *General Accounting for the Mac,* do a lot for the money.

Because accounting is central to running a business, do your homework before buying a particular software product. Carefully match it to your business's needs, perhaps with consultation—an increasing number of third parties specialize in selecting accounting software. If you need to automate just part of your business, like professional billing, restrict your search to programs that emphasize your targeted area.

As in most product categories, the most creative accounting software in the microcomputer industry is being developed for the Mac. Products such as Chang's *Rags to Riches* and Layered's *Insight* take advantage of the Mac user interface to present easy-to-understand views of accounting data and what they mean. Look for even more imaginative products to come, including multiuser capability.

Databases

Database products can be divided into two general categories—low-end file managers and high-end relational databases. At the low end, a variety of products can be used for miscellaneous data-management tasks. They differ in reporting flexibility, forms-management capability, ease of learning, price, and other features. The wide choice of file managers for the Mac—there are literally dozens—can make it tough to find the right one. Some of the more popular programs are *Filemaker Plus,* which includes a forms generator; *Fact Finder; OverVue;* and *Record Holder.*

Soon, powerful *dB III* workalikes will provide access to existing templates for MS-DOS; they include *dbMan* from Varosoft, *Mac Max* by Nantucket, and Ashton-Tate's *dBase Mac.*

Some database products are hard to categorize. Borland's *Reflex* is an inexpensive but powerful relational database that rivals the high-end products in some functions. Chang's *C.A.T.* is dedicated specifically to managing daily business activities. *Business Filevision* is for applications that can be best expressed graphically. Some products are sold primarily as forms managers, marketing and sales programs, or mailing list managers.

For basic list management, a file manager may be the best. For complex applications, someone on your staff needs at least a general understanding of programming. It's almost impossible to use the more sophisticated products without that skill.

Other Applications

For a small business, personal financial software is often more than sufficient for accounting. Monogram estimates that more than half the copies of *Dollars and $ense* are used for accounting. When shopping for financial management software, look for convenience in handling recurring transactions. For personal financial software, no widely used product was designed specifically for the Mac, though the recent *Mac Money* is having some success. For business presentations, several products with varying emphases are available (see "Graphics" and "Publishing").

In tax preparation, the most popular product is Softview's *MacInTax,* which completes personal and corporate returns and prints a full set of IRS-approved forms on both the ImageWriter and LaserWriter. Button-Down Software's *Profit Stalker* is designed for portfolio management, and Pro-Plus's *MarketPro* handles portfolio management, fundamental analysis, and technical analysis. You can do many financial management functions using a spreadsheet. In fact, a variety of *Excel* and *Works* templates handle tax preparation and planning, financial management, investment tracking and analysis, and other jobs. These templates usually are less expensive than dedicated programs, and you can modify the formulas to create customized solutions; for more information, see "Professions and Industries."

Tools for handling numbers, mastering finances, and running an efficient enterprise

Business Desk Accessories

So many desk accessories are on the market—so many new ones are released all the time—that it's impossible to keep track of them all. However, a few deserve special mention.

Borland's *SideKick* is probably the most popular desk accessory for the Mac. It functions as a rolodex with auto-dialer, notepad, outliner, spreadsheet, calendar, clock, simple file manager, communications program, and print spooler. Each of these can be installed as a desk accessory, and even if you buy the program for one function, you have the others when needed.

Imagine Software's *Smart Alarms* has become very popular. It's basically a reminder accessory that can be used for appointments, recurring events, or other types of activities. It's useful for people who have to manage their time carefully, as is Softview's *MacInUse* time log.

The key issue of multiuser capability has begun to be addressed; for more on this, see "Communications." The market for Mac business software continues to grow in diversity and competition, so be sure to prepare yourself before you choose a package.

—Steve Mann

Vendor	Product	Price	Notes
Accounting			
Acius, Inc.	4D Runtime	295.00	4-pack. Allows use of custom 4th Dimension database. Req. 1MB.
Baker Graphics	BAKERForms Accounts Payable	49.95	Runs Microsoft Works. Preprinted checks; vendor YTD; bank reports. Req. 512K, 800K drive.*
Baker Graphics	BAKERForms Accounts Receivable	49.95	Runs Microsoft Works. Preprinted invoices; statements; summary reports. Req. 512K, 800K drive.*
Baker Graphics	BAKERForms for Payroll	49.95	Runs Microsoft Works. Preprinted checks; employee YTDs; weekly/biweekly payroll. Req. 512K, 800K drive.*
Baker Graphics	BAKERForms for Purchasing	49.95	Runs Microsoft Works. Preprinted purchase orders; vendor YTD; total reports. Req. 512K, 800K drive.*
Chang Laboratories, Inc.	General Business 3-Pak	499.50	3-module accounting: GL; AR; AP. Req. 512K.
Chang Laboratories, Inc.	Macintosh Professional 3-Pak	649.50	3-module accounting: GL; AP; Professional Billing. Req. 512K.
Chang Laboratories, Inc.	Rags to Riches	199.95	Integrated accounting. 5 separate modules: GL; AR; AP; I; Time-Billing Payroll. Req. 512K. $199.95 ea.
Chang Laboratories, Inc.	Retail 3-Pak	649.50	3-module accounting: GL; AP; I. Req. 512K.
CheckMark Software, Inc.	AMS General Ledger	195.00	Full-featured, double-entry ledger system w/report generator.
CheckMark Software, Inc.	CheckMark MultiLedger	395.00	GL; AR; AP; I. Prints checks, invoices. Usable w/CheckMark Payroll. Req. 512K.*
CheckMark Software, Inc.	CheckMark Payroll	295.00	Payroll w/tax calculation. Prints paychecks, earnings, check register, W-2s. Usable w/MultiLedger.
Circo Business Solutions	Multiuser Desktop Accounting	2495.00	Integrated template: GL; AR; AP; SA; I. Includes Omnis. 2-5 users. Req. 512KE, hard disk. 1 user, $1795.
Computer Associates/ BPI Systems, Inc.	BPI General Accounting	249.00	GL w/subsidiary ledgers for payables, receivables, payroll. Exports to Jazz, Excel, Multiplan. Req. 512K.
Digital Etc., Inc.	Maccountant	149.95	GL w/AR, AP aging. 99 depts.; 11 reports w/financial ratios; 2000 accts. Req. ext. drive.
Digital Etc., Inc.	Turbo Maccountant	495.00	GL; AR; AP; I; payroll; budgeting; statements; 8000 accts.; 500 depts. Req. 512K, ext. drive.
Great Plains Software, Inc.	Great Plains Accounting Series	695.00	7 modules. Req. 512K, 800K drive, Apple Hard Disk 20 or 20SC. $695 ea. Purchase Order/Network Manager, $395.
Great Plains Software, Inc.	Great Plains Network Manager	395.00	Allows multiuse of Accounting Series. Req. Mac 512KE, AppleShare.
Great Plains Software, Inc.	Plain and Simple One-Write Accounting	695.00	Auto. one-write accounting. Req. 512K, ext. drive.
Haba Systems	Home Accountant	59.95	Personal accounting package.
Lake Avenue Software	The Assistant Controller Series	495.00	Modules: GL; AR; AP; JC; I; OE/I; Payroll; Construction JC; Point of sale; more. Req. 512K, hard disk, McMax. $495 ea.
Layered	Insight	595.00	Modules: GL; AP; AR w/billing; analysis/interpretation. Req. 512K, ext. drive. $595 ea.

Vendor	Product	Price	Notes
Microfinancial Corp.	FLEXWARE	795.00	Integrated modules: AP; AR; GL; IC; JC; Payroll; Processing. To 5 users. Req. 512K, hard disk. $795 ea.
Microsystems Consulting, Inc.	Microsystems	595.00	Modules: AR; AP; IC; JC; I. Req. 1MB, hard disk. $595 ea. up. Contractors' versions avail.
Migent Software, Inc.	In-House Accountant	149.00	Search/edit; text styling; financial formulas; report functions. Req. 512K.
Monogram	Dollars and Sense	149.95	Starting templates. Usable w/Forecast tax planner. Records assets, iabilities, income, expenses, checks. Mac 128K to Mac Plus.
Peachtree Software L.P.	Back to Basics Accounting System	199.00	Entry-level GL, AR, AP. Req. ext. drive, 80-column printer.
Personal Training Systems	MasterWorks Series	49.95	Self-paced 90 min. tutorials for Microsoft Works. Audiocassete, disk. Req. 512K.
REMS Software	REMS Investor 2000	395.00	Multiyear cash-flow projections; IRR; EMRR. Current tax law. Req. 512K.
SBT Corp.	SBT Database Accounting Library	100.00	Modules for dBMAN or McMax. Includes DBMS source code. $100-$395 ea.
Sierra On-Line, Inc.	MacOneWrite	89.95	3-module pegboard: CD; AR; GL. Req. 512K. Separately, $59.95 ea.
Softsync, Inc.	Accountant, Inc.	299.95	Integrated GL, AR, AP, I. Req. 512K, 800K drive.*
Softsync, Inc.	Personal Accountant	49.95	Double-entry bookkeeping for personal/small bus. use.
Software Bridge, Inc.	Payroll-Bridge	495.00	Tax/deduction; hourly/salaried. Prints checks, W-2s, reports. Req. 512K, ext. drive.
Software Products Division	Accounting Modules for Omnis	195.00	Modules: AR; AP; OE; Payroll Checks; IPOs; GL. $195 ea.; unlocked, $395 ea.
Vertical Business Software,Inc.	General Ledger/Accounts Payable	500.00	Double-entry GL/AP. Prints checks. Use w/Retailer/ Wholesaler. Req. 512K, hard disk, ImageWriter.
Western Software Associates	Time Saver Payroll	75.00	Payroll: salaried, hourly, commissions. Tax tables; reports. Prints W-2s. Req. Excel.
WOS Data Systems, Inc.	WOS Fund Accounting System	5995.00	GL; AR; Budgeting; PO voucher; Payroll. Req. 512K, hard disk. Avail. w/o AR for $4995.
WOS Data Systems, Inc.	WOS/CTB/McGraw-Hill Fund Accounting	5995.00	Allows data sharing on AppleShare. GL; PO voucher; payroll; billing. Req. 512K.
Business Forms			
1st Desk Systems	1stSCAN	295.00	Auto. form generator/data-entry system. Req. 512K.
Fine Grove Ltd.	Point 'n' Click	295.00	Inventory/invoicing system. Req. 1MB, ext. drive.
Megahaus	MegaForm	295.00	Form generator w/database. Prints data/forms. Req. 512K, ext. drive.
New Directions Software	FastForms Construction Kit	149.00	Form generator. Fills out/prints forms. Req. 512K.
Silicon Beach Software	Silicon Press	79.95	Label/form program w/graphics, merge printing. Req. 512K.
Spectrum Digital Systems	TrueForm	1995.00	Completion of existing forms, manually or merged w/database. Full spreadsheet functionality. Includes scanner. Req. 512K.

Vendor	Product	Price	Notes
Database Management			
1st Desk Systems	1stFILE	195.00	Programmable relational database. Formerly 1stBASE.
1st Desk Systems	1stMERGE	150.00	Mail-merge list manager. Sorts; finds; creates personalized mailings.
1st Desk Systems	1stTEAM	795.00	Multiuser 1stFILE. Req. 512K.
Acius, Inc.	4th Dimension	695.00	Multiuser. Object-oriented graphics; programming language. Req. 1MB.*
Ashton-Tate	dBASE Mac	495.00	Relational database; procedural language; turnkey applns. Req. 512K, 800K ext. drive.
Blyth Software, Inc.	Omnis Express	99.00	Speeds development of Omnis applns. Req. 512K.
Blyth Software, Inc.	Omnis 3 Plus	575.00	160MB capacity. Multiuser versions for networks. Req. 512K.*
Borland International, Inc.	Reflex	99.95	Relational database w/spreadsheet functions. Sort; import/export. Req. 512K.*
Brock Software Products, Inc.	BROCK KEYSTROKE Advanced/ Data-Encripted Version	149.00	Relational database/report generator. Req. 512K.
Brock Software Products, Inc.	BROCK KEYSTROKE Filer	49.95	Filer-database program.
Brock Software Products, Inc.	BROCK KEYSTROKE Relational Database & Report Generator	99.00	Relational database/report generator. Req. 512K.
Chang Laboratories, Inc.	C.A.T.	399.95	Relational database. Contacts; activity; time. Req. 512K.
Forethought, Inc.	FileMaker	195.00	Form-oriented database.
Forethought, Inc.	FileMaker Plus	295.00	Form-oriented database. Req. 512K, 800K drive.
Haba Systems	MacRelax	99.95	Personal database. Req. 512K.
Marvelin Corporation	Business Filevision	395.00	Graphic database/visual filing. Req. 512K, ext. drive.
Marvelin Corporation	Filevision	195.00	Visual filing for Mac 128K to Mac SE.
Microfinancial Corp.	FLEXWARE APPLICATIONS DEVELOPMENT SYSTEM	1000.00	DBMS; program generator; report writer. Req. 512K, hard disk. To $2795.
Microsoft Corp.	Microsoft File	195.00	DBMS. Reconfigures files; creates report formats for data files.
Nantucket Corp.	McMax	295.00	DBMS. Allows dBASE use on Mac 512K to Mac SE. Menu-driven/interactive-command modes. Req. 512K, ext. drive.
Odesta Corp.	Double Helix II	595.00	Relational database/applns. developer. Req. 1MB, hard disk.
Odesta Corp.	Helix MultiUser Kit	300.00	Multiuser network for DH II. 1 host/3 other nodes. Needs no file server. Req. hard disk for host, 512K for guests.
Odesta Corp.	Helix MultiUser System	795.00	Multiuser relational database. Includes DH II/Helix Multiuser Kit. Req. 1MB, hard disk for host, 512K for guests.
ProVUE Development	OverVUE	295.00	Relational database w/spreadsheet capabilities.
Software Discoveries, Inc.	RecordHolderPlus	69.95	Data manager w/color, graphics. Prints text/graphics on ImageWriter II.

Vendor	Product	Price	Notes
Visionary Electronics, Inc.	Time Wand Manager	489.00	Relational database w/ability to import/export ASCII text files. Req. 512K.
Working Computer	Business.TOOLS	299.95	Omnis3 Plus techniques, tricks, theory for business problems. Req. 800K drive.
WOS Data Systems, Inc.	WOSbase	495.00	Multiuser relational database. Use w/WOS Fund Accounting. Req. 512K, hard disk. 1 user, $195.
Desk Accessories			
Affinity Microsystems, Inc.	AffiniFile	79.95	Access to notes/graphics via built-in index. To 5000 words per topic; 1000-2000 topics.
Apple Computer, Inc.	Macintosh Switcher Construction Kit.	19.95	Allows user to switch/transfer data bet. applns. w/o returning to Finder. Req. 512K.
Apple Computer, Inc.	MacroMaker	call	Assigns text strings or menu commands to single key or key combination.
Blyth Software, Inc.	SmartPad	39.95	DA database. Req. 512K.
Borland International Ltd.	Sidekick	99.95	Calculator; calendar; outliner; auto-dialer; phone log; more. Req. 512K.
BrainPower, Inc.	Graphidex	124.95	Graphics; indexing; retrieval; editing. Online graphics retrieval. Creates custom fonts. Req. 512K.
CE Software	Calendar Maker	39.95	Creates presentation-quality calendars. Outputs to MacPaint or PICT files; imports from many applns.
CE Software	DiskTop	49.95	Finder functions; launch/shutdown. LaserStatus: Laser info.; font download/PostScript. Req. 512KE.
CE Software	MockPackage.Plus	35.00	MockWrite; MockPrinter;. MockTerminal; MockChart. EZ-Menu. "Phantom. finger."
CE Software	QuickKeys	99.95	Assigns actions to keys; strings keystrokes into sequences. Req. 512K.
Cortland Computer	TopDesk	59.95	Macro program; BackPrint; Touch-n-Go; Blank; MenuKey; Encrypt; Launch. Req. 512K.
Cortland Computer	Touch-n-Go	39.00	Macro program. Req. 512K.
Deneba Software	CANVAS DA	99.95	Integrates MacPaint/MacDraw in a DA.
Educomp Computer Services	Muscle	39.95	Free-form database organizer. Access by index or word.
Educomp Computer Services	QuickLabeler	19.95	Prints program icons, disk directories, and user-defined labels on ImageWriter.
Electronic Arts	BatteryPak	49.95	Daytimer; date keeper; note pad.
Electronic Arts	HomePak	49.95	Word processor; info. manager; telecom. home terminal.
Electronic Arts	TimeLink	49.95	Electronic diary/planner.
EnterSet	QuickSet	49.00	Calculator; calendar; note filer; phone dialer; spooler; encrypter.
Greene, Inc.	QuickDEX	35.00	Name/address organizer.
Haba Systems	Habadex	99.95	Desktop organizer. Req. 512K.
Harvard Associates	DeskToppers	19.95	Various DAs.

BUSINESS AND FINANCE

Vendor	Product	Price	Notes
Imagine Software	Smart Alarms/Appt. Diary	49.95	On-screen reminders at specified times; appt. diary. Req. 512K. Multiuser version, $149.95 plus $10 per node.
Layered	Front Desk	149.00	Time mgt./billing for professionals. Req. 512K.*
Microlytics	Word Finder	59.95	Thesaurus w/15,000 key words, 22,000 syns. Use w/MacWrite, Word, others.
Olduvai Software, Inc.	DA-Switcher	39.95	Allows unlimited number of DAs by switching under Apple menu. Req. 512K.
Olduvai Software, Inc.	Icon-It!	79.95	Places icon bar in any appln.
Peripheral Computers & Supplies, Inc.	EUREKA!	24.95	File locater for hard disks. Req. 512K.
Shana Enterprises	UserGuide	79.00	Allows nonprogrammers to implement online help. Supports text/graphics. Req. 512K.
SoftView, Inc.	MacInUse	79.00	Tracks Mac use. Records appln. use, data, other input.
Solutions, Inc.	SmartScrap & The Clipper	59.95	Improves Scrapbook w/table of contents; cropping/scaling tool. Req. 512K.
Working Software, Inc.	Findswell	49.95	Document finder/opener. Shows date/time last used, size, program. Req. 512K.
Financial Management			
Button-down Software	Profits!	495.00	Charting/analysis of stocks, commodities, mutual funds. Req. 512K.
Comvest, Inc.	MacTrust/MacBank	295.00	Strategy for obtaining $100,000 unsecured loan. Book/audiotapes. Req. 512K, ext. drive.
Dow Jones & Co., Inc.	Dow Jones Market Analyzer	299.00	Tech. stock market analysis. Tracks indiv. stocks/market. Req. 512K, 800K drive, modem.
Dow Jones & Co., Inc.	Dow Jones Market Manager Plus	249.00	Portfolio management/analysis; tax info. Req. ext. drive, Straight Talk.
Electronic Arts	Financial Cookbook	19.95	Personal-investment planner. "What if" scenarios.
Electronic Arts	Isgur Portfolio System	199.95	Investment-portfolio planner. Req. 512K.
GenMicronics	Financial Decisions	45.00	112 Excel templates. Appraisals; bonds; investments; mortgages; sales; more. $45 ea.
Innovative Software	MacCheck	39.95	Home accounting. Time; money; budgets; database; reports.
JLC Software, Inc.	OPTUM-3	699.95	Integrated financial planning for professionals. Req. 512K.
Larry Rosen Co.	Financial Management Templates	89.00	Templates for Excel, Jazz, or Multiplan. Bond Analyzer; Financial and Interest Calculator; Investment IRR Analysis. $89 ea.
Micro Trading Software, Ltd.	Wall Street Watcher	250.00	Stock charting. Cycles/trend-line; stock-quote retrieval; more. Req. 512K.
Monogram	Dollars and Sense	149.95	Personal/small bus. financial mgt. Use w/Forecast.
Monogram	Monogram Exporter	15.95	Allows Dollars and Sense users to export data to text files.
Options-80	Options-80A	170.00	Analyzes buying/selling of listed put and call options, spreads, shares.
Pro Plus Software, Inc.	Market Pro	395.00	Integrated investment-portfolio mgt./analysis. Req. 512K.

Vendor	Product	Price	Notes
Pro Plus Software, Inc.	Market Pro Commodities Analysis Package	195.00	Integrated investment analysis for commodities.
Simon & Schuster	Jake Lasser's Your Money Manager	99.95	Financial management for home or small bus.
Smith Micro Software, Inc.	Market Link	85.00	Unattended access to Dow Jones/The Source. Retrieves quotes/bridges to Excel. Req. 512K, Hayes-compatible modem.
Smith Micro Software, Inc.	Stock Portfolio System	225.00	Portfolio mgt. 14 reports on stocks, bonds, options, mutual funds. Req. 512K.
Strategic Planning System	Masterpiece	3500.00	Financial planning and office mgt. for professionals. Req. 512K.
Survivor Software, Ltd.	MacMoney	74.95	Financial record keeper. Req. 512K.
Viking Technologies, Inc.	Loan Calculator	15.95	Calculates payments, rates, principal, interest. Compares loans.
WOS Data Systems	Detente Reports	189.50	Creates reports from dBASE III, Fund Accounting, Smart Software. Req. 512K.
Mailing Lists			
1st Desk Systems	1stMERGE	150.00	Mail merge/list mgr.
Pecan Software Systems	MailManager	99.95	Generates/maintains mailing lists.
Satori Software	Bulk Mailer	149.00	1- to 4-across labels, roster format. Up to 8600 names. Merge w/Word. Req. 512K.*
Software Discoveries, Inc.	MergeWrite	49.95	Mail merge for MacWrite/Record Holder Plus. Use alone or w/DBMS. Req. 512K, MacWrite.
Marketing/Sales			
AnaMatrix, Inc.	POS-IM	3000.00	Maintains inventory from sales history; creates POs. Req. 512K, bar code reader, 20MB hard disk.
Applied Micronetics	Office Productivity System	475.00	Billing; invoicing; productivity reports; budget/cost tracking; more. Req. 512K, ext. disk.
Breakthrough Productions	Market Master	275.00	Processes sales leads w/follow-up. Personalized letters; scripts; mailings. Req. 512KE.
Julian Systems, Inc.	Automated Management System	call	Telemarketing sales/product analysis. Tracks inventory, receivables, commissions.
Julian Systems, Inc.	Automated Telemarketing System	call	Phone/database/information analysis; merge-letter generation; operator-performance tracking.
Julian Systems, Inc.	MacGallery	call	Art gallery mgt. Tracks art pieces, histories, customers.
Julian Systems, Inc.	MacJewel	call	Jewelry store inventory mgt. point of sale. Tracks pieces, histories, customers.
Layered	Front Desk	149.00	Time mgt./billing. Req. 512K.*
Software Complement	Client/Mac	99.00	Sales/lead-tracking system. Mail merge; follow-up capability; time management. Req. Omnis 3 Plus, 512K.*
Software Complement	P-O-S/Mac	995.00	Multiuser point of sale software. Invoices; credit/debit tracking; AR; inventory w/commission.

Vendor	Product	Price	Notes
Vertical Business Software,Inc.	Retailer	450.00	Inventory control. AR; PO; customer/supplier files. Use w/AP, GL. Req. 512K, hard disk, ImageWriter.
Vertical Business Software,Inc.	Wholesaler	800.00	Inventory control. Customers/suppliers; 10 discount levels; back orders. Use w/AP, GL. Req. 512K, hard disk, ImageWriter.
Working Computer	Clients & Profits for Advertising Agency	1895.00	Estimating; scheduling; invoicing. Req. 1MB. GL/payroll modules avail. Multiuser, $2995.
Productivity			
Affinity Microsystems, Inc.	Tempo 1.2	99.00	Adds intelligent macros; conditional branching/looping; timed delays; works bet. programs. Req. 512K.
Affinity Microsystems, Inc.	Tempo II	149.95	Tempo 1.2 plus "smart" playback/control/"autopaste" of text, graphics. Req. 512K.
Affinity Microsystems, Inc.	Tempo/RT	call	Run-time version of Tempo 1.2. Req. 512K. Price varies.
Apple Computer, Inc.	Hypercard	49.00	Graphics-based engine for organizing info. Includes programming language. Free w/Macs purchased after 11/87.
Berkeley System Design, Inc.	inLARGE	95.00	Large-print display software for the visually impaired. Req. 512K.
Berkeley System Design, Inc.	Stepping Out	95.00	Software alternative to large-screen hardware. Req. 512K.
Claris Corp.	MacProject	125.00	Visual planning for mgt./analysis of complex projects.
Deneba Software	Comment	99.95	Electronic equivalent of 3M's Post-it notes. Req. 512K.
Micro Planning International	Micro Planner Plus	495.00	Resource mgt. Overloads; leveling; schedule updates; more. Req. 512K, hard disk.
Owl International, Inc.	Hypertext	134.95	Nonhierarchical info. system for outlines, cross-references. Accomodates text/graphics. Req. 512K.
Shana Enterprises	Manpower Scheduling	995.00	Scheduling for 1000+ employees. Shifts; vacations; more. Req. 1MB, hard disk.
Spreadsheets and Integrated Software			
Bravo Technologies, Inc.	MacCalc	139.00	Multiple-font supporting spreadsheet. Usable in desktop publishing. Req. 512K.
Data Tailor, Inc.	Trapeze	295.00	Prepares, evaluates, analyzes, presents all information on one worksheet. Req. Mac 512KE, ext. drive.
DataPak Software, Inc.	Executive Office	249.95	Word processor; form generator; worksheet; mail mgr.; database. Req. 512K, ext. drive.
DataPak Software, Inc.	My Office	129.95	Advanced text editor; form generator; database.*
Heizer Software	Excellent Exchange	4.00	Sample disk/catalog of 260+ Excel templates. Bus.; accounting; engineering; more. Req. 512K.
Heizer Software	WorksXchange	4.00	Sample disk/catalog of 100+ templates for Works. Bus.; accounting; engineering; more. Req. 512K.
Lotus Development Corp.	Jazz	395.00	Integrated worksheet, graphics, database, word processing, com. Req. 512K, ext. drive.
Lundeen & Associates	WorksPlus Command	99.95	Macro package for Microsoft Works. Req. 512K.

Vendor	Product	Price	Notes
Microsoft Corp.	Microsoft Excel	395.00	Large spreadsheet. Integrated graphics; database. Compatible w/Lotus 1-2-3. Req. 512K.*
Microsoft Corp.	Microsoft Multiplan	195.00	Spreadsheet. Linkable worksheets; report generator. Req. ext. drive.
Microsoft Corp.	Microsoft Works	295.00	Integrated word processing, DBMS, spreadsheet, com. Req. 512K.*
Personal Training Systems	Excelerate Training Series	39.95	Self-paced 60 min. tutorials for Excel. Audiocassette/disk. Req. 512K.
Tax Management			
FutureVest	Taxplan	69.00	Duplicates individual income tax forms; automatically calculates tax.
Island Computer Services	TAXMASTER	50.00	Tax templates for Excel. W-4 forms. Calculates IRAs, capital gains, itemized deductions, more.
Monogram	Forecast	69.95	Tax estimates/planning; includes current tax law. Can use Dollars and Sense data for federal tax.
SoftView, Inc.	MacInTax Federal 1987	119.00	Income tax prep./planning. Prints/displays exact IRS forms/schedules. CA supplement, $65.
SoftView, Inc.	MacInTax Planner	79.00	Supplement to MacInTax 1986. 5-year planner. "What if" investment calculations.
TaxCalc Software, Inc.	TaxCalc Tax Planner 3 Alternatives	175.00	Template for Excel. Individual federal tax planner w/3 alternative columns. Req. 512K, Excel.
TaxCalc Software, Inc.	TaxCalc Tax Planner 86, 87, and 88	275.00	Template for Excel. 3-year individual federal tax planner. Req. 512K, Excel.

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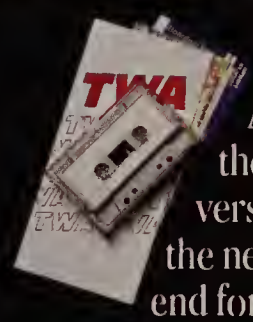

First, The Problem.
Apple is telling the world these days that the power, versatility and compatibility of the new Macintoshes are going to end forever any doubts that these are first-class business machines.

But what kind of business you actually get down to has as much to do with the peripherals you attach as it does the computer itself. Take mass storage. For many companies, serious business means nothing less than 40 megabytes of primary capacity and at least an equal amount of backup — ideally in the same subsystem package.

A few packages do exist with those specifications. But the price tags are absolutely stratospheric — which for many companies anxious to get down to business can be downright catastrophic.

First Class, The Solution.
The Sider Model C46 changes all of that. Sure, you get capacity, speed, performance, reliability, backup and restore. You get a slim, smart-looking, easy-to-install unit that is compatible with the Macintosh Plus, SE and II — and the Apple II+, IIe and IIGs as well. And with our 60 meg tape (not 40 meg, like the competition), you get backup you can lock up for security and, thanks to total Sider cartridge interchangeability, you get data you can pack up and take anywhere.

But what you get that really astounds is a price tag the others can only envy. It reads $1995.

It also reads First Class Peripherals, for those of you wondering how that price could possibly be attached to this product. For years, the names "Sider" and "First Class" have been synonymous with truly affordable, zero defect mass storage among Apple II users.

Now, we intend to establish the same standard in the Macintosh world. With a family of subsystems that includes, besides the Model C46, both a 20- and 40-megabyte hard disk Sider subsystem and a Sider 60-megabyte tape backup subsystem.

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Professions and Industries

Lawyers, doctors, dentists, religious organizations, various types of contractors, and specialty retailers rely on the common procedure of processing lists of clients, patients, members, or customers and communicating with the world through form letters and bills. Software developers for personal computers have automated many of the office functions of such groups, using database and word processing technology. The busy professionals who use these programs insist that they simplify common tasks without introducing new problems in operating the computer.

With its visual user interface, the Macintosh excels at offering an easy-to-learn, intuitive system. Basic applications like word processing take only a few minutes to learn, and streamlined professional applications for the day-to-day chores of numerous businesses have now appeared on the market.

The Professional Look

Mac software is available for managing nearly every type of professional activity. The mainstream categories that were developed first are now represented by scores of office-management programs. While many of these are quite similar from a programming viewpoint, the crucial factor is how effectively they are customized to their users' particular needs.

On the market are programs that track lawyers' hours and bill for them; update a medical office's inventory and patient records; and offer ways of analyzing, for investment and tax purposes, the profitability of a real estate holding. You can buy applications that focus on one aspect of a business or a larger package that integrates several tasks. In addition, such highly specialized businesses as a horse farm (*MacHorse*), a lawn-care business (*Mac WeedMan*), or a union local (*Union Dues Manager*) can be run on a Mac.

Businesses that thrive on good mailing-list management are especially well supplied with Mac software. Special applications for retail businesses, professional sales offices, collection agencies, video rental stores, and churches automate the most tiresome chores in these areas and improve tracking of prospects. Detailed catalogs of special purpose software are also available from several sources: good examples are Blyth Software's directory of business programs that use *Omnis 3 Plus* and Heizer Software's catalog of templates for *Microsoft Excel*.

The major products in this area differ more in focus than in actual capabilities. Blyth emphasizes its qualified developers and authorized development centers as sources of custom database applications. Odesta, maker of *Double Helix,* is actively involved in connectivity between the Mac and DEC's VAX environ-

ment. *4th Dimension* has an edge in features like graphics fields, complex file structures, and the ability to build very Mac-like turnkey applications.

Different Origins

Professional software for *vertical markets* tends to come from a specialized group that uses tools specific to a task. Rather than being a full-time programmer, the author of real estate software, for example, may be a real estate consultant who has developed a custom application using a popular database instead of a traditional programming language.

Thus, most programs for vertical markets use a database as a programming language, since list management is the heart of the applications. Many of the software packages in this section "run under" the databases *Omnis, Helix, FileVision,* or *4th Dimension*; the package needs one of these databases in either a full or an application-only (*run-time*) version. If you own the database, you can then modify the application package after you buy it, while if you use the application with a run-time version of the database, you are constrained to the developers' designs. In this unique *development environment,* upgrades that make the programs faster and more powerful may be produced by improvements in both the overall application and the particular customized database.

Picking a Package

Three key points are worth serious consideration in evaluating professional applications software. If you buy a word processor and decide you don't like it, chances are you can buy a different one and convert all your old files. However, if you buy an inventory manager and find it too slow or too limited to handle your store, most likely you will have to start over at substantial cost and inconvenience. Insist on a comprehensive, hands-on demonstration of any software that's going to be at the center of your office life for years to come.

■ *Price:* Many of these programs are expensive, relative to other Mac software. The developers frequently feel that they have produced something of great value to a restricted market and therefore must set higher prices to recover their own investment in time. A $4000 program that straightens out a law office's billings may be a bargain, but a $20 sales tracker that "forgets" leads is too expensive. Fortunately, nearly all Mac software requires little training–any product that scores well on the next two points will pay for itself in a few months at most.

■ *Completeness:* Before you evaluate any software, make a list on paper of the information you think you need to track in your business (you might want to sketch out a few sample forms). Then make sure that the software you are considering can handle all the data you have listed. If it can't–some packages offer fairly restricted data structures–you can expect problems down the road. You may be able to pass on some chores, like word processing, to other software, but be very demanding about the central record-handling part of a professional application.

■ *Speed:* A point that might not occur to you while watching a demonstration is the prospect of performance slowdown by the software with large sets of records. The typical Mac (512K, Plus, or SE) is intrinsically a fast machine, but its CPU's hands are busy painting all those user-friendly screens for you. This means that some applications may look magnificent on little 20-record demo data sets but can slow to an unacceptable crawl when working with real-world lists of several hundred clients or customers. Insist on a software demonstration that involves as much data as you are likely to handle in your own activities.

From law and medicine to engineering and science — meeting the demands of specialized applications

Since the developers of these programs often ask $1000 or more for some documentation and a disk or two, you have the right to demand more upfront information than is given for simple utilities. Ask the vendor for a list of satisfied customers and call at least three of them–they're usually glad to comment on the strengths and weaknesses of each application from months of firsthand experience.

What's Next?

We can expect higher speed and better integration of graphics. Most applications written for vertical markets are getting faster: the database programs have been recoded for increased speed, and SEs and Mac IIs make formerly poky programs scoot along 40 to 200 percent faster. Also, more programs are imitating the revolutionary database graphics pioneered by *Filevision,* so you can expect well-designed text-plus-graphics screens to appear in most vertical-market software in the next few years. This is good news, since it means that friendly programs that respond as fast as you can point will be available to support most business activities. Although the Mac took a few years to penetrate many of these markets, there is no doubt that it is here to stay.

–Charles Seiter

Vendor	Product	Price	Notes
Engineering and Science			
Automatix, Inc.	AI 90	8000.00	Factory computer. Compatible w/Mac II. $8000 up.
Bishop Graphics CAD Systems Corp.	Gerber Aperture Assignment Software	150.00	Assigns Gerber photoplotter apertures for Bishop CAM network media conversion/photoplotting. Req. 512K, QC 30000 or QC 30007.
Bishop Graphics CAD Systems Corp.	Gerber Output	250.00	Outputs Quik Circuit design file to photoplotter. Req. 512K, QC 30000 or QC 30007.
BioPac Systems	MacPacq	995.00	Mac functions as digital oscilloscope, chart recorder, waveform generator. Req. 512K.
BrainPower, Inc.	DesignScope	249.95	Analog/digital system-level design simulator. Oscilloscopes; VC filters; PLL; VCO; FFTs; text import/export. Req. 512K.
Cambridge Electronics, Inc.	Data Acquisition System	call	Graphic environment for data aquisition/display, analysis, reports. Req. 512K. Price varies.
Capilano Computing Systems, Ltd.	LogicWorks with Utilities	199.95	Digital-circuit design. Schematics/simulations; library; info. utilities; more. Req. 512K.*
ComVest, Inc.	Mac R.C.S.	495.00	Residential conservation software for energy evaluation. Estimates; JC. Req. 512K, ext. drive.
Engineering Programming Concepts	Engineer's Aide	695.00	Integrated standalone package for process engineers. Req. 512K.*
Erez Anzel Software	BEAM MAC	145.00	Structural analysis w/design aids for simple beams. Any number of loads; up to four nodes. Req. 512K.
Erez Anzel Software	BEAM MAC II	345.00	Structural analysis w/design aids for continuous/simple beams. Any number of nodes, hinges, loads. Req. 512K.
Erez Anzel Software	FRAME MAC	595.00	Structural analysis w/design aids for 2-D frames, trusses, beams. Any number of nodes, restraints, hinges, loads. Req. 512K.
Erez Anzel Software	MacCOGO	145.00	Precise dimensions, area, moment of inertia. 3-window display. Req. 512K.
GW Instruments	MacADIOS	2500.00	Data-acquisition hardware/software. Req. 512K.
IC Sensors, Inc.	SENSORBUS SB2004	180.00	Modules. Analog input; digital output; relay output. $180 ea. Req. serial cable. Thermocouple input module, $370.
IDAC, Inc.	MACONTROL	695.00	Data acquisition. Collects/processes/interprets analog digital signals. Lab-instrument control. Req. 512K.*
Metaresearch, Inc.	BenchTop Series	630.00	Data acquisition/control for physics, medicine, psychology.
microneering	BOLTS	645.00	Finite-element analysis of US Standards bolts. Req. 512K, 800K drive.
microneering	SAMBAS	4500.00	Finite-element structural analysis of multibody axial-symmetric solid objects or multibody 2-D objects. Req. 512K, 800K drive.
microneering	THREADS	745.00	Finite-element analysis of std. threaded-connector configurations. Req. 512K, 800K drive.
National Instruments Corp.	LabVIEW	1995.00	Graphic programming for instrument control, data-acquisition/analysis applns. Req. 1MB.

Vendor	Product	Price	Notes
Probability Distribution	Spectral Analysis	75.00	Forward/inverse transform; power spectrum; more. Graphs the series and its transform. Prints graphs, tables. Mac 128K to Mac SE.
Remote Measurement Systems	ADC-1	449.00	RS-232 peripheral for lab/industrial/home monitoring. Software sensors, $45.
Satori Software	Project Billing	695.00	Tracks time, expenses, project costs for engineering projects. Req. 512K.*
Strawberry Tree Computers	Analog Connection	595.00	Data-acquisition board for lab/factory. Chromatography; precision temperature/weighing. Req. 1MB. Avail. for SE/II. Price varies.
Strawberry Tree Computers	Analog Connection WorkBench	495.00	Data acquisition/control; data logging; display for Mac SE/II. Req. 1MB, Analog Connection.
Tecmar, Inc.	Lab Master II	1250.00	Data-acquisition/process-control system for Mac II.
The MacNeal Schwendler Corp.	MSC/pal	1495.00	Finite-element stress/vibration analysis of structures, mechanical components. Req. 512K, ext. drive.
Vamp, Inc.	McCAD EDS-1	1495.00	Electronic design for Mac II. Schematics; printed-circuit board; digital-circuit simulation.*
Vamp, Inc.	McCAD-Gerber View/Translator	895.00	Translates Gerber files to McCAD database for editing/revision. Req. 512K (suggest 1MB).
Vamp, Inc.	McCAD-Schematics	495.00	Electronic schematic-design package. Built-in library editor; 3 kinds of bussing. Req. 512K.
Legal			
ComVest, Inc.	MacInc	199.00	Self-incorporation/corporate-records template for Excel. Req. 512K, ext. drive. Lawyer's version, $299.
Nolo Press	WillWriter	49.95	Helps create valid will. Q & A format; estate-planning manual. Req. ImageWriter-compatible.
Satori Software	Legal Billing II	895.00	Time accounting/billing. ABA approved. Req. 512K.*
Working Software, Inc.	Spellswell Legal Dictionary	99.95	Legal dictionary for Spellswell. 20,000 words. Req. 512K, ext. drive.
Mathematics and Statistics			
Borland International, Inc.	Eureka: The Solver	295.00	Equations; trigonometry; exponential, stat., financial functions. Req. 512K.
BrainPower, Inc.	MathView Professional	249.95	Numerical analysis: multidimensional function evaluation; 2-D/3-D plotting; matrix operations; more. Req. 512K, 800K drive.
BrainPower, Inc.	StatView 512+	349.95	Graphic stat.-analysis/data-handling package. Charts; graphs; more. Req. 512K, 800K drive.
Clear Lake Research	CLR ANOVA	75.00	Stat. analysis of variants.
Cricket Software	StatWorks	125.00	1- and 2-way ANOVA; T-tests; correlation coefficients; cross-tabulation; normality tests.
Data Description, Inc.	Data Desk Professional	175.00	Stat./graphics w/desktop interface. Req. 512K, 800K drive.
Design Science	MathType	149.00	Incorporates math equations into word processing/desktop publishing documents via Clipboard. Req. 512K.

Vendor	Product	Price	Notes
High Performance Systems	STELLA Software	295.00	Simulation/modeling for bus. Icon-driven model construction. Req. 512K.
IDAC, Inc.	WormStat	19.95	Stat. for lab, industry, classroom. Mean std. deviation; histogram; median range; regression; tests.
Industrial Computations, Inc.	PowerMath	100.00	Simple algebra to complicated calculus.
Logiciel/Eustat	STAT80	249.00	Simple descriptive stat. to hypothesis testing. Req. 512K, 800K drive. Professional version, $399.
NCSS	NCSS-MAC	49.00	Multiple regression; ANOVA; cross-tabulation; T-tests; principal components; nonparemetric tests; univariate stat. Req. 512K, ext. drive.
Software for Recognition Technologies	MacEqn	44.95	Equation-processing DA. Creates complex equations, PICT files.
StatSoft, Inc.	GANOVA	99.00	General univariate/multivariate analysis of variance.
StatSoft, Inc.	MacSS	245.00	Stat. integrated w/statistical DBMS/graphics. Req. 512K.
StatSoft, Inc.	STATFAST	119.00	Descriptive stat.; T-tests; correlations; cross-tabulation; charts; plots; more.
Structural Measurement Systems	Parameter Manager	495.00	Manages/analyzes/graphs time, date, sample-based data for trend plots, histograms, forecasts.
Systat, Inc.	DESIGN	90.00	Sample size estimation; tables of expected mean squares for balanced experiments; more. Req. 512K.
Systat, Inc.	LOGIT	90.00	Full multinomial logit model for binary or multicategory-dependent variables. Req. 512K.
Systat, Inc.	PROBIT	90.00	Estimates multiple regression models; analysis of covariants. Req. 512K.
Systat, Inc.	SYSTAT	595.00	Stat./graphics/data-mgt. package. 512K.
Systat, Inc.	TESTAT	90.00	Test-summary stat.; reliability coefficients; std. errors of measurement; item analysis. Req. 512K.
Systat, Inc.	TOBIT	90.00	Regression analysis; parameter estimates; covariant matrices; predicted-value residuals; mills ratios; more. Req. 512K.
Medical and Dental			
CMA Microcomputer	CMA Dental/ Medical for the Macintosh	1295.95	Patient receivables; claim-form prep.; diagnoses-mgt. system. Req. 512K, hard disk.
Harvard Medical School Decision Systems Laboratory	HeartLab	149.00	Simulation. Teaches cardial auscultation. Sound filter; headphones. Req. 512K.
Julian Systems, Inc.	Julian Medical Office Management	call	Medical/dental/optometric record-keeping, billing, patient tracking.
Orthodontic Processing	Quick Ceph	895.00	X-ray evaluation; cephalometric analysis; treatment simulation. Req. 512KE. Digitizer, $895; upgrade, $195.
Unicom Software Development Group	Medical Office Manager	2750.00	Maintains billings, demographics, records. Adapts to new insurance forms/regulations. Req. 512K.
Working Software, Inc.	Medical Dictionary for Spellswell.	99.95	Medical; dental; psychiatric; veterinary; pharmaceutical drugs; chemical/drug trade names. 35,000 words. Req. Spellswell.

Vendor	Product	Price	Notes
Real Estate/Property Management			
ComVest, Inc.	MacInvest Plus	595.00	Contracts/offers; investment analysis; investment mgt. Avail. separately. Req. 512K, ext. drive.
ComVest, Inc.	MacMortgage	149.00	Computes accelerated payments to build equity, savings. Req. 512K, ext. drive. Professional version, $199.
HMS Computer Company	Mortage Loan Calculator	129.00	Qualifies buyers. Required income or maximum loan. Computes taxes/amortization. Req. 512K.
HMS Computer Company	Prospect Closing System	595.00	For home builders/residential developers. Req. 512K.
HMS Computer Company	Prospect Tracking System	595.00	Tracks sales. Includes Omnis 3 Runtime. Req. 512K.
MacLord Systems, Inc.	Property Management	1295.00	Residential/commercial properties. Accounting; budgeting; operations; more. Multiuser version avail.
Technalysis Services	ProAnalysis	295.00	Investment analysis. Req. 512K.
Unicom Software Development Group	Building Permit Manager	990.00	Stores/prints building, plumbing, electrical-permit data. Generates fee reports. Req. 512K.
YARDI Systems, Inc.	Advanced Property Management	795.00	Automated commercial/residential property mgt. 400 units per folder. Req. 512K.
YARDI Systems, Inc.	Basic Property Management	395.00	Automated residential property mgt. 400 units per folder. Req. 512K.
YARDI Systems, Inc.	Deluxe Property Management	1195.00	Automated property mgt. for condominium assns., storage units, etc. 1000 units per folder. Req. 512K.*
YARDI Systems, Inc.	Property Management	395.00	Comprehensive mgt. package. Investment Analysis, $245.
YARDI Systems, Inc.	Toolkit	245.00	Investment Analysis. Req. 512K.

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Mac The Knife, MacWeek

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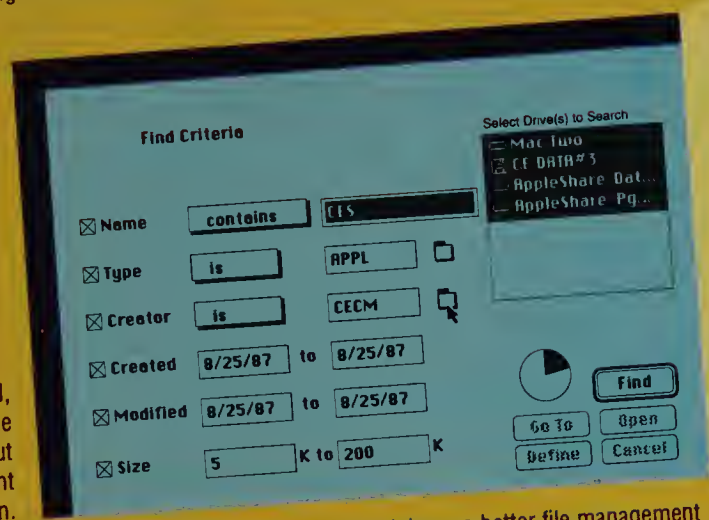

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4-1/2 Mouse rating-MacUser, August 1987

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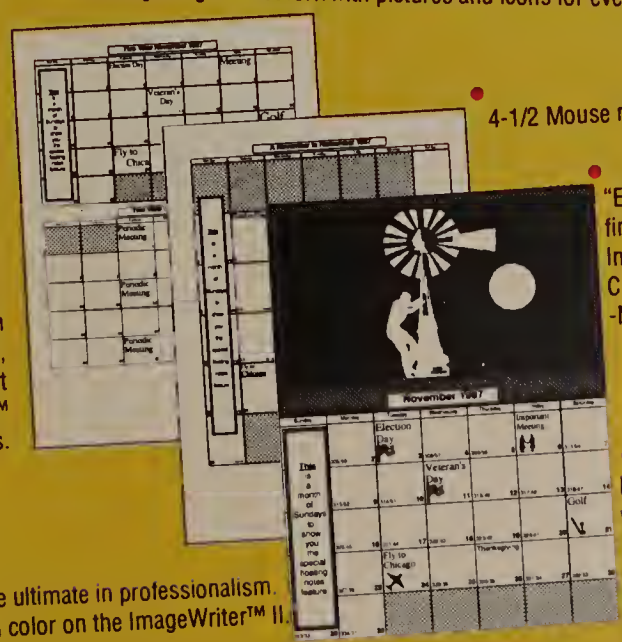

- 4-1/2 Mouse rating, MacUser, December 1986

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Publishing

At one time, the scope of word processing was limited to manipulating words. The graphics orientation of the Macintosh, however, has expanded word processing horizons. The integration of graphics with text in a variety of fonts, sizes, and styles was the first step toward desktop publishing. Initially considered separate applications, word processing and page layout are now moving toward a common goal–publishing finished documents.

For serious desktop publishing, you probably need both a word processor and a page-makeup program. Since the Mac II and SE opened up the field, developers have been working to blend these two applications. Meanwhile, Mac publishing grows more and more competitive.

Word Processing

If your needs are limited to writing letters and memos, you may be satisfied with a basic word processing program such as *MacWrite,* or one with more features like *WriteNow,* which has a spelling checker and shows multiple columns on screen; or *MindWrite,* which offers a built-in outlining function.

However, these programs lack the breadth of features found at the high end of the market. For heavy-duty word processing needs–for example, if you create, edit, and reformat large documents, or need a table of contents or index–you may want to consider *Microsoft Word* 3.0, *LaserAuthor,* or one of the upcoming new products. While these programs normally take some effort to master, they return the investment with a myriad of additional capabilities to facilitate writing, editing, and formatting documents. Such additional features are a significant convenience if you do frequent, complex word processing.

In the high-end category, *Word* 3.0 (with its upgrade, 3.01) is the reigning champion. However, several competitive programs are ready for release, including *WordPerfect,* a Mac version of the most popular word processing program for IBM PCs and compatibles, and *FullWrite Professional* from Ann Arbor Softworks, makers of the popular graphics program *FullPaint.*

Desktop Publishing

If your formatting needs are substantial, a desktop publishing program is probably what you need. The original front-runner in the field is Aldus's *PageMaker,* but new programs, especially *Ready,Set,Go!* version 4 from Letraset, are challenging its dominance. The innovative *XPress* from Quark was first to bring color makeup to the Mac, and Interleaf's new package offers minicomputer power for about $8000. Each offers a

few unique concepts and features, but all provide the ability to mix text and graphics in a paste-up environment.

The available desktop publishing programs are less easily distinguishable from each other than word processors are. While some strengths and weaknesses are apparent, they are fighting for position in basically the same market. As with word processing, determine which programs provide (or lack) the features you emphasize.

Price, Value, and Ease of Use

The cost of software is always a factor in making a purchasing decision. Basic word processing programs generally fall in the range of $125 to $175, while those with more features usually cost between $200 and $400. Most desktop publishing programs range from $400 to $500, although a few cost up to $700.

The greatest price you pay in purchasing a program will not be measured in dollars but in the time and effort required to implement it for your work. So you should factor in the issues of features, speed, and ease of use. If you don't require a feature-laden program, the shorter learning period required by a simpler program is attractive. On the other hand, don't make the mistake of buying a program that will ultimately be inadequate, just because it's easier to pick up. Remember, too, that many dealers discount a program from its list price.

Other Key Considerations

■ In addition to correcting spelling, a spelling checker can identify typographical errors like missing, repeated, or reversed characters. Similarly, automatic hyphenation can divide words that fall at the end of a line. While these features are typically found in a word processing program, they are also beginning to crop up in some desktop publishing programs: *XPress,* for example, has a spelling checker, and *Ready,Set,Go!* 4 offers both a spelling checker and style sheets.

If your word processing program has no integrated spelling checker, numerous programs are sold separately. They usually take the form of a desk accessory, which you invoke while using the word processor.

■ Outlining is another useful tool in preparing and reorganizing documents. Some word processing programs, such as *Word* 3.0 and *MindWrite,* integrate it. Other independent packages include Living Videotext's *More,* an elegant and powerful outliner, and *Acta* from Symmetry, an able, practical desk accessory.

■ How text and graphics interact on the page is a major issue. The more basic word processing programs such as *MacWrite* and *WriteNow* allow graphics to exist only within their own horizontal area, so you cannot place text next to a graphic image. Although some, like *Word* 3.0, allow graphics next to text, their methods are sometimes cumbersome.

While all desktop publishing programs allow you to place graphics next to text, some provide unique capabilities in this area. *XPress* and *Ready,Set,Go!* 4, for example, automatically wrap text around graphic images, even if they are irregularly shaped.

■ Style sheets are just beginning to find their way into Macintosh writing and publishing programs. They allow you to associate various elements of your document and quickly reformat them. With substantial documents such as reports, longer newsletters, magazines, or even books, style sheets are invaluable. Expect them to be implemented widely in the coming year.

Into the Future

As these two areas continue to mature, overlapping of functions will increase. Desktop publishing programs will be adorned with features traditionally associated with such word processing programs as spelling checkers, style sheets, indexing, and tables of contents, while word processing programs will incorporate more page-layout capabilities, such as true screen-to-printer fidelity and better handling of graphics. In addition, graphics and text will mix more smoothly.

Master all stages of written communication, from the organization of concepts to the production of visually appealing pages

Programs currently available on the IBM PC and compatibles will continue to influence the evolution of Macintosh word processing. For example, the macro programming capability of *WordPerfect* and others will show up in Mac programs. Macros save time by customizing a program's operation through automating sequences of keystrokes (or mouse clicks) to repeat a given task.

Finally, batch-oriented minicomputer-style programs are expected in the next six months from PS Compose and others (Interleaf's is available now). These products are best suited to book-length, multivolume, or multiple-author environments.

The term *document processing* suggests the interface of word processing and page makeup, and signifies the progress being made in Macintosh publishing. With the added power of the Mac II and the SE, developers will introduce some very innovative products for the market.

–Eric Alderman

Vendor	Product	Price	Notes
Desktop Publishing			
Addison-Wesley Publishing Co.	TEXtures	495.00	Implements TeX typesetting std. Req. 512K, ext. drive.*
Adobe Systems, Inc.	Adobe Separator	99.00	Color-separator DA for Adobe Illustrator.
Aldus Corp.	PageMaker 2.0	495.00	Text/graphics integration. Req. 512K, 800K drive.
Aldus Corp.	PageMaker Classroom	750.00	Desktop publishing training materials for 10 students. Req. 512K.
Aldus Corp.	PageMaker Portfolio: Designs for Newsletters	79.00	Newsletter formats. Req. 512K.
Baudville	Award Maker Plus	49.95	Personalized, professional certificates w/integrated text/graphics. Req. 512K.
Boston Publishing Systems, Inc.	MacPublisher III	295.00	Rotates text/graphics; resizes PostSript files; imports from MacWrite/Word. 1024 pp. per issue. Req. 512K.*
Bree Technologies, Inc.	Set & Send	995.00	Mac-to-Compugraphic MCS system. Generates professional-quality galleys.
Digital Technology International	DisplayAd MakeUp System	2495.00	Layout system for display ads. Outputs to laser printer. Req. 1 MB. Phototypesetter version, $2995.
FTL Systems, Inc.	MacTex 2.0	750.00	Professional typography based on TeX 2.1. Req. 1 MB, ext. drive, PostScript-compatible printer, AppleTalk.*
Knowledge Engineering	JustText	195.00	Word processing/page-makeup system for PostScript compatibles. Req. 512K.
Letraset USA	Ready,Set,Go!4	495.00	Style sheets; type specs.; auto. runarounds; interactive facing pages; batch/word processing; Req. 512K.
Mindscape,Inc.	GraphicWorks	149.95	Page layout. Combines text, graphics, scanned images. Req. 512K.
Olduvai Software, Inc.	Read-It!	149.00	OCR. Produces text file w/word processors. Req. 1MB.
Orange Micro, Inc.	Ragtime 2	395.00	Combines words, numbers, graphics, forms. Req. 512K.
Personal Training Systems	PageTutor Series	49.95	Self-paced 90-min. tutorials for PageMaker 2.0. Audiocassette, disk. Req. 1MB.
PS Publishing, Inc.	PS Compose	800.00	Page layout/composition. PostScript CG version, $2000.
Quark, Inc.	Quark XPress	695.00	Integrated desktop publishing software. Req. 512K.*
Radco & Associates/ Fit to Print	E-Z Newsletter Kit	29.95	Forms; Writer's Word Menu; proofreading guides.
Solutions, Inc.	SuperGlue	89.95	Graphic-transfer DA. Text extraction; font substitution; image-size change. Req. 512K.
Solutions, Inc.	The Curator	139.95	Catalogs/integrates art. EPSF, TIFF, MacPaint, Glue, or PICT formats. Req. 512K.
Target Software	Scoop	495.00	WYSIWYG text editor; graphics package; spellchecker. Req. 512K.
Index/Bibliography			
Boston Publishing Systems, Inc.	MacIndexer	79.95	Indexes multipage MacWrite/Microsoft Word documents. Req. 512K.

Vendor	Product	Price	Notes
Personal Bibliographic Software, Inc.	Biblio-Link Series	195.00	3 programs reformat from databases (DIALOG, MEDLARS, others) to Pro-Cite. Req. 512K w/Sys. 4.1 up. $195 ea.
Personal Bibliographic Software, Inc.	Pro-Cite	295.00	Bibliographic database/text-mgt. system. Sort; search; index; format. 20 pp. per record. Req. 512K w/Sys. 4.1 up.
Unicom Software Development Group	MacFilm	2750.00	Film/book/subject database. Maintains film/patron circulation. Overdue notices. Req. 512K.
Outliners			
Deneba Software	XTRA	195.00	Outline processor w/presentation graphics. Includes DA version. Req. 512K.
Living Videotext, Inc.	MORE	295.00	Combines outline processing/desktop elements, including tree/bullet charts. Req. 512K.*
Living Videotext, Inc.	ThinkTank 512	195.00	Combines reorganization w/word processing. Req. 512K.*
MaxThink	MaxThink	89.00	Extensive reorganization/manipulation/idea processing. Req. 512K.
Symmetry Corporation	Acta 1.2	59.95	Outline processor.
Spellcheckers			
Aegis Development, Inc.	Doug Clapp's Word Tool	79.95	Text analysis; punctuation/style checker. Rates grade level, readability, interest level, length. Req. 512K.
DataPak Software, Inc.	Liberty Spell II	79.95	Spellchecker for major word processors. Req. 512K.
Deneba Software	Coach Merriam-Webster Thesaurus	59.95	45,000-word entry-point thesaurus w/definitions and hypertext virtual cross-reference capability. Req. 512K.
Deneba Software	Coach Professional	195.00	Spelling Coach/Coach Thesaurus features plus 80,000-word dictionary w/full definitions. Req. 512K.
Deneba Software	Spelling Coach	99.95	Interactive/batch spellchecker DA. 154,000-word dictionary. Req. 512K.
Electronic Arts	Thunder 1.1	49.95	DA spellchecker. Req. 512K.
EnterSet	MacGAS	99.00	Spellchecker; glossary; thesaurus. Use w/MacWrite, Word, Jazz. Req. 512K.*
Lundeen & Associates	WorksPlus Spell	79.95	Integrated w/Works. Functions accessed from word processing menus. Glossary. Req. 512K, Works.
Working Software, Inc.	Lookup	49.95	Looks up single-word spelling from inside any Mac program. Req. 512K.
Working Software, Inc.	Spellswell	74.95	Proofreader and spellchecker. Req. 512K.
Word Processing			
American Intelliware Corp.	Scriptwriter	495.00	Dual-column scripts, formatted screenplays. Req. 512K, 800K drive.
American Intelliware Corp.	Storyboarder	495.00	Print/video storyboards. Intelligent formatting; special effects; more. Req. 512K, 800K drive.
Ann Arbor Softworks, Inc.	FullWrite Professional	395.00	Built-in MacDraw environment. Outlining; auto. text wrap; spellchecker; mail merge; more. Req. 1 MB, ext. drive.
Claris Corp.	MacWrite	125.00	7 typefaces; compatible w/MacPaint, MacDraw, MacTerminal.

Vendor	Product	Price	Notes
Innovision	Calliope Plus	99.00	Nonoutlining idea-processing tool. Req. 512K.
LM Software	Mac Spec	199.95	Word processor for specs. Req. 512K.
Microsoft Corp.	Microsoft Word 3.0	395.00	Integrated outliner; graphics; spellchecker; format recall; more. Req. 512K, 800K drive.
Mindwork Software	MindWrite	295.00	Develops concepts into copy. Outliner w/integrated word processing. Req. 512K.
Personal Training Systems	LearnWord 3.0	49.95	Self-paced 90 min. tutorials for Microsoft Word 3.0, 3.01. Audiocassette, disk. Req. 512K.
T/Maker Company	Write Now	175.00	WYSIWYG multiple columns on screen; 50,000-word spellchecker.
WordPerfect Corp.	WordPerfect	395.00	Word processor w/115,000-word spellchecker; thesaurus; text columns; macro; merge. Req. 512K.

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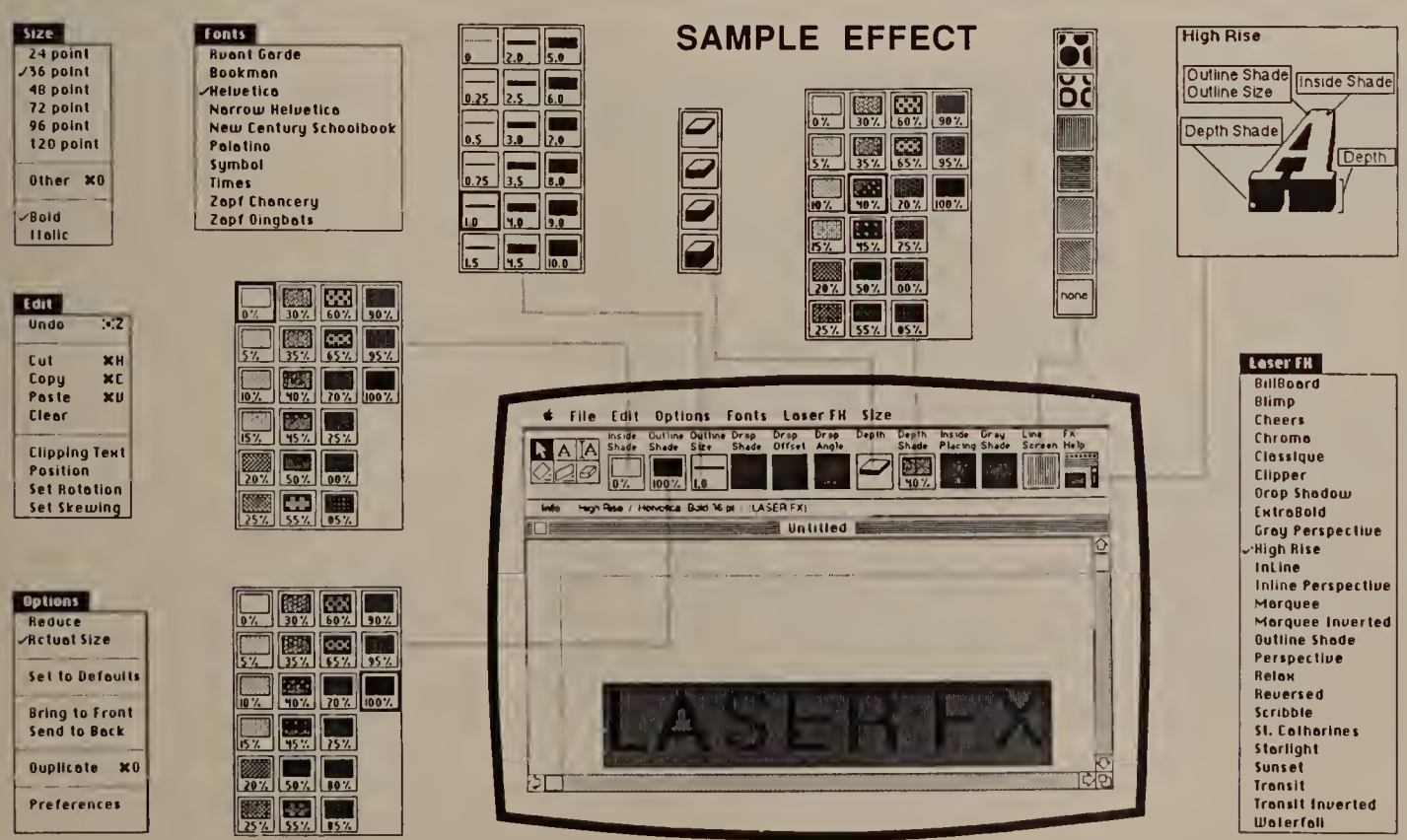

This is an example of one of the options available in **Laser FX.** We are using High Rise in this example to show how easy it is to use. The actual effect took 20 seconds to create and approximately 35 seconds to print. The screens above are actual reproductions of the options chosen to produce the effect seen on the right. We are using Helvetica®, one of the standard fonts found in the PostScript™ laser printer. As you can see by the various option windows above, there are millions of combinations of this effect (excluding point size, skewing, and rotation options). The examples on the right are a few of the 30 effects available on

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Graphics

Graphics programs have evolved and diversified more than any other type of Macintosh program. Although *MacPaint* is taken for granted now, it was revolutionary when introduced and set a user interface standard still emulated by many others. But rather than simply building on *MacPaint*'s breakthrough, Mac graphics have proliferated in a dozen directions, offering specialized features for disciplines ranging from the fine arts to architecture to desktop publishing.

Their users are just as diverse. Workers who occasionally place illustrations into office reports may get by with an inexpensive paint program like *MacPaint* or *FullPaint*. Those who make elaborate presentations can benefit from such business graphics programs as *More, Power Point,* and *Microsoft Chart*. Technical illustrators may find *Adobe Illustrator* appropriate, while desktop publishers can create graphics in paint and draw programs, select images from clip-art disks, or digitize pictures with a 300-dots-per-inch (dpi) scanner. Engineers and architects can choose among a variety of 2-D and 3-D programs, each suited to a particular area of professional design.

Graphics applications can be broken down into several major categories.

Painting and Drawing

Applications that use bit-mapped graphics, like *MacPaint, FullPaint,* and *MacBillboard,* are known as paint programs. They simulate such real tools as a paintbrush, an eraser, or a pencil. These programs are usually appropriate for the fine arts, detailed technical illustrations, and other illustrations that require dot-by-dot detail. Although you can edit pictures pixel by pixel, paint programs operate at a resolution of 72 dpi, producing relatively coarse drawings by today's standards. *FullPaint* broke the 72-dpi barrier by allowing 300-dpi editing for more precise LaserWriter output, but working at that scale is time consuming.

Object-oriented programs such as MacDraw and *MacDraft* record elements of a drawing as separate objects that you can restructure if necessary. While a rectangle drawn with a paint program is simply a pattern of pixels, a draw program produces dynamic objects. For example, a rectangle with a certain size, border width, and pattern fill can be resized without distorting its proportions or shading. Draw programs are suitable for drafting applications (floor plans, simple architectural renderings, and the like), flowcharts, and technical drawings that make use of gray scales and laser fonts.

Hybrids

Several programs have the attributes of both paint and draw programs. *SuperPaint* and *GraphicWorks* combine bit-mapped and object-oriented graphics, as well as LaserWriter fonts. While the two programs have similar capabilities and prices, differences in user interface and specialized tools make comparison shopping a must. Another interesting hybrid is *LaserPaint,* which is in a higher price bracket but offers word processing and color separation modules in addition to draw and paint modules. You can customize any of these programs by adding laser or bit-mapped fonts, which range from mathematical symbols to decorative script.

PostScript

PostScript-based graphics programs like *Cricket Draw* and *Illustrator* take advantage of the printing capabilities of the LaserWriter (300 dpi) and higher-resolution printing devices like phototypesetters (up to 2500 dpi). While drawing programs utilize some PostScript capabilities, such as gray scales, PostScript-based programs give nonprogrammers impressive special effects, including rotated and angled text or objects, text on an irregular path, and fountains (gradient fills). Artists use *Illustrator*'s Bezier curves to trace drawings and then shade and refine them with the program's other tools. *Cricket Draw,* a general-purpose drawing program, places an impressive collection of PostScript effects in an easy-to-use interface.

Gray-Level Editing

Desktop publishers can now choose among a number of 300-dpi scanners to digitize photos or artwork for publications. Digitized photos can be retouched with *ImageStudio* from LetraSet, which allows you to work in 65 levels of gray. A Mac II with a color graphics card and color monitor can display all 65 shades, offering an ideal environment in which to edit pictures. *ImageStudio*'s tools follow the *MacPaint* tradition by closely imitating the functions of artists' tools, including charcoal, watercolors, and even fingerpaint. It is currently the only program in this category, though others will follow soon.

Computer-Aided Design and Drafting

Macintosh drawing programs didn't remain in two dimensions for long. Over the years, a number of three-dimensional graphics programs have appeared, including *Mac3D, Easy3D, MacSpace, MacModel, Phoenix 3D,* and *Dimensions.* Responding to the need for more sophisticated capabilities, both *MacSpace* and *Easy3D* evolved into professional versions, *SpaceEdit* and *Pro3D.* A promising newcomer, *Super 3D,* should be available soon. These packages range in price from $50 to $2500 and are appropriate for applications ranging from the graphic arts to architectural rendering. In addition to general-purpose 3-D software, such specialized programs as *Schema, NewStudio,* and *MacPerspective* allow architects to view their creations in three dimensions.

In the two-dimensional CAD arena, programs like *MiniCad, EZ-Draft,* and *MGMStation* offer architects, engineers, and draftsmen the features and precision they need, and a Macintosh version of the popular *VersaCAD* is in the works. Although the Mac has yet to fulfill Apple's dreams of "desktop engineering," it is winning converts among architects, engineers, and other designers because of its relatively low price, its widening software base, and the fact that Mac software requires less training time than do CAD programs on other PCs.

Color

Mac owners who wanted color output were once limited to the ImageWriter II or pen plotters. Now the Mac II offers impressive color capability, but because color output devices are still scarce, the color generally goes no further than the screen. Color has been added to some programs, including *Mac3D, VideoWorks II, Cricket Draw, GraphicWorks, SpaceEdit,* and *MGMStation.*

Draw, paint, and design with the electronic equivalents of an artist's studio and a drafting table

Cricket Draw, LaserPaint, and *Illustrator* allow artists to make color separations, but the process requires a good deal of expertise. Film recorders from Matrix, Dunn Instruments, and Presentation Technologies have been released this year. Lightspeed's *Color Page Layout System,* a graphic design program that runs on the Mac II, includes an interface to a color scanner for input and a thermal printer for color output.

The Future

In addition to color output devices, established standards are urgently needed for storing and transferring graphic images; to date, many programs offer a hodgepodge of file format options (*MacPaint,* PICT, TIFF, EPSF, and so on). While the diversity of programs precludes a universal graphics file format, developers should work together to ensure that, for example, one program's TIFF files are compatible with another's.

The Mac II has opened up a new world of graphics; the ability to display 256 colors on a large monitor is a far cry from the small-screen, one-bit-per-pixel, black-and-white Mac of only a year ago. The Mac II's open architecture will promote the development of add-on products such as floating-point coprocessors to speed the display of 3-D images.

Programs in all the categories mentioned above will continue to improve. New, as yet unheard-of types of programs will appear (no one knew of PostScript-effects programs or gray-level editors until recently). And perhaps someone will bring us a color version of *MacPaint* to begin the cycle of Macintosh graphics evolution again on a grander scale.

—Erfert Nielson

GRAPHICS

Vendor	Product	Price	Notes
2-D			
Abvent, Inc.	AnaTool	795.00	Structured system analysis/documentation of system-info. flow. Data dictionary; consistency checks; process specs. Req. 512K.
Abvent, Inc.	Blue-60	1495.00	Engineering workbench for creating/maintaining data models in software development. Std. entity-relation diagrams using Boyce-Codd method. Req. 1MB.
Abvent, Inc.	MacSpace	385.00	2-D/3-D software for 3-D design. Mac 512K to Mac SE.
Abvent, Inc.	SpaceEdit	625.00	Vector-based 2-D/3-D CAD for designers. Perspective views; Y-frame; solid or shaded format. Color optional for Mac II. Req. 512K.
B. Knick Drafting	MacPerspective	179.00	Precision drafting for complex drawings. Req. 512K.
Bishop Graphics CAD Systems Corp.	Quik Circuit PCB 30000	525.00	Layout of printed-circuit artwork for 2-sided/multilayer boards. Req. 512K.
Bishop Graphics CAD Systems Corp.	Quik Circuit PCB 30007	395.00	Layout of printed-circuit artwork for 2-sided/multilayer boards. Req. 512K.
Bishop Graphics CAD Systems Corp.	Quik Circuit PCB 30015	95.00	Layout of printed-circuit artwork for 2-sided/multilayer boards. Req. 512K.
Bridgeport Machines	EZ-DRAFT	2495.00	Dynamic dimensioning. Projection from any orthogonal view to any other view. Complies with ANSI stds. Y14.5. Req. Mac 512KE to Mac SE, hard disk.
Bridgeport Machines	EZ-EDM	4667.00	N/C programming station. 2- or 4-axis part-designing programs for CNC WIRE/EDM equipment. Req. Mac 512KE to Mac SE, hard disk. $2800 if bought w/EZ-TURN or EZ-MILL.
Bridgeport Machines	EZ-MILL	4667.00	Creates N/C part programs for milling centers. Library; postprocessors; more. Req. Mac 512KE to Mac SE, hard disk. $2800 if bought w/EZ-TURN or EZ-EDM.
Bridgeport Machines	EZ-SURF	3500.00	Designs 3-D wire-frame models for cutting die molds. Full 3-D shapes w/arcs, lines, splines. Add-on to EZ-MILL. Req. Mac 512KE to Mac SE, hard disk.
Bridgeport Machines	EZ-TURN	4667.00	N/C programming station for 2- or 4-axis turning centers. Interactive. Dynamic menu selection; translators for IGES/DXF files. Req. Mac 512KE to Mac SE, hard disk. $2800 when bought w/EZ-MILL or EZ-EDM.
CompServCo	MacCAD	49.00	12-template CAD library for McDraw/McDraft. Req. 512K.* $49-$199 ea.
Computer Aided Systems for Engineering	MacDesigner	1995.00	CAD design system. Dynamic dimensioning; multiple views; layering; multiple colors. Req. 1MB, hard disk.
Computer Shoppe	PowerDraw	595.00	CAD for architects/engineers. Precision placements for x/y coordinates. Keyboard-entry option. Req. 1MB.
Cricket Software	Cricket Graph	195.00	Graphing for bus., engineering, science. Req. 512K.*
Data Basics, Inc.	SNAP!	695.00	Professional CAD. Built-in plotter driver; auto-dimensioning/area measurements; fence/group commands. Req. 1MB.

Vendor	Product	Price	Notes
Diehl Graphsoft, Inc.	Minicad	495.00	CAD. 9-decimal precision; 40 color layers. Req. 512K.
DKL Technology, Inc.	MacGDS	6200.00	GDS II stream-compatible workstation w/DBMS. Supports 64-99 layers of structure nesting. Req. 512K.
Douglas Electronics	Douglas CAD/CAM	95.00	Printed-circuit board layout/mfg. system. Req. 512K, 1200-baud modem.
Gibbs & Associates	ncCAD	1575.00	Interactive design for numerical-control mfg. Req. 512K, two 800K drives.*
Gibbs & Associates	ncCAM	2075.00	Creates numerical-control programs from ncCAD. IGES-compatible. Req. 512K, two 800K drives.*
Innovative Data Design, Inc.	MacDraft	269.00	Object-oriented draft/design for architects, engineers, draftspersons, publishers, graphic artists. Req. 512K.*
Macro Print CAD	MACROPrint	495.00	Plots CAD programs on Versatec or CalComp electrostatic plotters. 400 dpi. Req. 512K.
Meta Software Corp.	Design	250.00	Graphics/text-handling. Helps visualize complex systems. Flow charts; more. Remembers logical relationships. Req. 512K. *
MICRO CAD/CAM, Inc.	MGMStation	799.00	CAD w/applns. for architecture, mechanical design, electronics, microwave. Plotter interface. Req. 512K.*
Vamp, Inc.	McCAD PCB	395.00	Electronic printed-circuit board design. Req. 512K. To $695.
Versacad Corp.	Versacad/Macintosh Edition	1995.00	Varied design objects, attributes; unlimited visual-symbol libraries. Req. 1MB, math coprocessor.
Visual Information, Inc.	DXF Transfer	495.00	Bidirectional data conversion bet. Design Dimensions/ AutoCAD. Req. 512K.
3-D			
A.P.P.L.E. Coop	MacModel	40.00	3-D graphics. Not HFS compatible.
Challenger Software Corp.	Mac3D	249.00	2-D/3-D drawing package w/2-D text ability. Req. 512K.*
Dreams of the Phoenix, Inc.	Phoenix 3-D Level One	49.95	3-D graphics appln. Req. 512K.*
Enabling Technologies	3D Clip Object Disks	49.95	Series of unmerged object files for use w/Easy3D and Pro3D/Mac. Req. 512K.
Enabling Technologies	Easy3D	149.95	3-D solid modeling. Lathe/Jigsaw creation; lighting; Boolean merge operations; full rotation; scaling. Req. 512K.
Enabling Technologies	Pro3D/Mac	349.00	3-D solid modeling for CAD/illustration. Lighting; Boolean merge; dimensioning; high-res. output. Req. 512K.
Silicon Beach Software	Super 3D	295.00	3-D editing/modeling. Built-in animation. Req. 512K. Enhanced version (supports color/math coprocessor), $495.
Spinnaker Software Corp.	da Vinci Series--Building Blocks	79.95	400+ architectually designed blocks. Creates 3-D building designs.
Spinnaker Software Corp.	da Vinci Series--Commercial Interiors	199.95	Scaled images of interior commercial spaces.
Spinnaker Software Corp.	da Vinci Series--Home Design	79.95	800+ scaled 3-D images of furniture, appliances, fixtures, accessories. Req. 512K, MacPaint, MacDraw.
Visual Information, Inc.	Design Dimensions	750.00	B/w 3-D CAD w/free-form surface modeling. Req. 512K. Color, $1395. Req. Mac II, SuperMac monitor.

Vendor	Product	Price	Notes
Visual Information, Inc.	Solid Dimensions	395.00	B/w 3-D solid modeling/visualizing w/shading, ray tracing. Req. 512K. Color, $1295. Req. Mac II, SuperMac monitor.
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Beck-Tech	MacMovies	99.00	Graphic animation. Full-screen update at 30 frames per second. MacPaint format. Req. 512K.
MacroMind	VideoWorks II	195.00	Creates b/w and color animated slide shows.
Business Graphics			
CE Software	CalendarMaker	39.95	Custom calendars. Pictorial, full-page, or 2 months per page.
Computer Friends, Inc.	Color Sep	99.00	Produces PostScript-compatible digital 4-color separations from PICT files. Req. 1MB.
Cricket Software	Cricket Presents. . .	495.00	Hi-res. b/w and color output to slides, overhead transparencies. Req. 512K.
Forethought, Inc.	PowerPoint	395.00	Desktop presentations. 35mm slides; overhead transparencies; flip-charts. Req. 512K, 800K drive.
Letraset USA	Image Studio	495.00	Image-retouching software.
Microsoft Corp.	Microsoft Chart	125.00	Standalone graphics. 42 formats; stat. functions. Compatible w/other Microsoft software.
Presentation Technologies, Inc.	ImageMaker	4995.00	35mm desktop slide-making. Over 8000 scan lines res. Phototypeset quality. Req. 512K.
Presentation Technologies, Inc.	ImageMaker Mac Driver	149.00	Uses Mac software w/ImageMaker to create 35mm color slides. Req. 512K.
Select Micro Systems, Inc.	FloMaster	495.00	Advertising media flow-charting. Runs in color on Mac II. Req. 512K.
Select Micro Systems, Inc.	MapMaker	295.00	Map-making system. Runs in color on Mac II. Req. 512K.
Clip Art			
bede tech	Coloring Book	24.00	Full-page animal illustrations for MacPaint. Req. 512K.
CompuCRAFT	MAC-ART LIBRARY	250.00	MacPaint images. Animals; Farm Life; Geography; Kitchen; Sports; Tools; Buildings; Signs/Symbols/Borders; more. Separate disks, $39.95 ea.
Desktop Graphics	DrawArt	49.95	Graphics library in MacDraw files. 150+ images. Customizes sizes, scales, patterns, borders. Prints on ImageWriter/ LaserWriter. Req. 512K.
Dynamic Graphic, Inc.	Desktop Art	74.95	Each of 7 volumes contains 200-300 images in MacPaint, MacDraw, or FullPaint files. Req. ext. drive. $74.95 ea.
Enzan-Hoshigumi (USA)	Japanese Clip Art	149.95	Scroll 1: Japanese religion/mythology; Scroll 2: Secular paintings/prints. $79.95 ea.
Image Club Graphics	Digit-Art Laser Graphics	99.00	Three 3-disk volumes of contemporary symbols, cartoons, borders. Req. 512K, MacDraw. Volume 3, $149.
Innovative Data Design, Inc.	Paste-Ease	49.95	1000 images/illustrations. Creates custom brochures, greeting cards, letterheads, more.
Miles Computing, Inc.	MTK 3: Mac the Ripper	49.95	2 disks. Holiday illustrations; 9 large decorative fonts.
Miles Computing, Inc.	MTK 5: People, Places, and Things	49.95	MacPaint files, classic to modern art. For illustration/ presentation graphics.

Vendor	Product	Price	Notes
Olduvai Software, Inc.	Post Art	49.95	3 disks. Images for Adobe Illustrator, Cricket Draw, MacDraw. Req. 512K.
Springboard Software	Art Ala Mac	39.95	People & Places. Faces; buildings; historical places.
Springboard Software	Certificate Library	34.95	100+ certificates/awards.
Springboard Software	Certificate Maker	59.95	200+ certificates/awards. 24 borders.
Springboard Software	Variety Pack	39.95	Grab bag of 600+ pictures.
T/Maker Company	ClickArt Business Image	49.95	Bus. images; industrial symbols; professional borders; flow-chart templates; graphic alphabets; abstract logos. Req. MacPaint-compatible appln.
T/Maker Company	ClickArt Holidays	49.95	Holiday images. Req. MacPaint-compatible appln.
T/Maker Company	ClickArt Personal Graphics	49.95	Contemporary images of people, animals, cars, symbols. Req. MacPaint-compatible appln.
T/Maker Company	ClickArt Publications	49.95	Borders; dingbats; cartoons; maps; decorative alphabets. Req. MacPaint-compatible appln.
Fonts			
Adobe Systems, Inc.	Adobe Type Library	145.00	35+ downloadable typefaces. Req. 512K, ext. drive, PostScript-compatible printer. $145-$185 ea.
Allotype Typographics	Downloadable Laser Fonts	85.00	Classical Greek. Serif/sans serif, $75; 100 Chemical structures, $125 (w/scientific text, $160); Polish serif/sans serif, $85; Serif small caps, $40.
Altsys Corp.	Family Builder	100.00	Font-combining utility. Auto. selection. For advanced users. Req. 512K.
Altsys Corp.	Fontastic Fonts	19.95	Bit-map fonts for Mac screen/ImageWriter. $19.95-$39.95 ea.
Altsys Corp.	Fontastic Plus	79.95	Bit-map font editor. Supports fractional character spacing, kerning pairs. MacPaint-style editing. Req. 512K.
Altsys Corp.	Fontographer	395.00	Professional font logo/design pack. Creates PostScript/bit-map fonts. Req. 512K, ext. drive.
Altsys Corp.	Fontographer Fonts	59.95	PostScript fonts for LaserWriter/Linotronics printers. Editable outlines avail. Req. 512K.
Casady Ware, Inc.	Fluent Fonts	49.95	2 disks. 48 fonts. Req. ImageWriter.
Casady Ware, Inc.	Fluent Laser Fonts	69.95	Series of 15 laser-font families. Req. 512K, LaserWriter. $69.95 ea.
Devonian International Software	FONTgenix	99.50	4-volume set. Dot matrix display fonts. Separate volumes, $29.50. FOREIGN FONTS EDITION, $49.50.
Devonian International Software	LASERgenix	32.50	Sets of downloadable LaserPrinter fonts. $32.50 ea.
Dubl-Click Software, Inc.	World-Class Fonts!	59.00	2 volumes. Text; decorative; borders; Cyrillic; Greek; Hebrew; architectural; symbolic; more. $39 ea.
Image Club Graphics	LaserType	149.00	8 fonts per set.
Invincible Software	Desktop Publishers Collection	550.00	Desktop publishing font collection. Individual fonts, $35.
Invincible Software	Faces Collection	35.00	18 display fonts in various styles. $35 ea.

GRAPHICS

Vendor	Product	Price	Notes
Miles Computing, Inc.	MTK 4: An Orchestra of Fonts	49.95	30 ImageWriter text fonts. 9-24 point. Supports international characters.
Neoscribe International	LaserPerfect Fonts	95.00	Downloadable fonts for LaserWriter/Linotronic printers. Kerned letters; old-style numerals; thin/em; italics; more. LaserHebrew, $145.
Paragon Courseware	ElectroFonts	99.00	Electronic analog/digital symbols. Scientific fonts, $49.95
Postcraft International, Inc.	Laser FX	195.00	30 effects from existing fonts. Up to 4999 pt. Req. 512K, LaserWriter.
Probability Distribution	Scientific Symbols Fonts	40.00	All characters in IBM's Selectric symbols ball; more.
T/Maker Company	Bombay LaserLetters	79.95	Downloadable display-type PostScript font packages. Seville/Plymouth packages avail.
T/Maker Company	ClickArt	79.95	Downloadable PostScript-compatible font packages. $79.95 ea.
T/Maker Company	ClickArt Letters 1/2	49.95	Fonts/typeface packages. $49.95 ea.
T/Maker Company	Seville LaserLetters	79.95	Downloadable display-type PostScript font packages.
The Laser Connection	The Adobe Typeface Library	185.00	Laser fonts. $185 ea.
Paint/Draw			
Adobe Systems, Inc.	Adobe Illustrator	495.00	Creates professional line art using PostScript. Req. 512K.
Altsys Corp.	Masterpiece	500.00	Creates professional line art. Font and logo creation, pair kerning, color-separation functions.
Ann Arbor Softworks, Inc.	Full Paint	99.95	Edits 4 documents at once. Color print; laser print; special effects. Req. 512K.
Beck-Tech	Chromatron	2995.00	Color-scan converter. Standard NTSC or PAL video output.16-color palatte. Compatible w/all paint programs.
Broderbund Software	The Print Shop	59.95	Creates/prints pictures, symbols, borders. Req. 512K.
CE Software	MacBILLBOARD	35.00	Enlarges pictures to 500 sq. ft. Creates banners 1- or 2-sheets wide. Req. 512K.
Claris Corp.	MacDraw	195.00	Onscreen palette of tools, shapes, std./custom rulers, grids. Resizes, rotates, moves, duplicates objects. Combines graphics/text.
Claris Corp.	MacPaint	125.00	Design tool. Creates free-form drawings; manipulates existing images.
Computer Friends, Inc.	Modern Artist	149.00	Full-color graphics. Artistic paint program for Mac II.
Computer Friends, Inc.	SuperChroma	1500.00	Professional color graphics. Adds color to Mac 512KE/Plus.
Cricket Software	Cricket Draw	295.00	Object-oriented drawing using graphic capabilities of PostScript printers. Req. 512KE, 800K drive.
Deneba Software	CANVAS	195.00	Integrates capabilities of MacDraw/MacPaint. Includes CANVAS DA.
EnterSet	QuickPaint	49.00	Graphics utility w/clip art. Locates MacPaint files/pastes them into desktop publishing applns.
Enzan-Hoshigumi (USA)	MacCalligraphy	149.95	Calligraphy. Simulates brush on paper. Req. 512K.
Folkstone Design, Inc.	GridMaker	49.00	Creates 3-D grids within MacDraw or MacDraft.

Vendor	Product	Price	Notes
Foundation Publishing , Inc.	The Comic Strip Factory	89.95	For creation of comics or layout of graphics. Req. 512K.
Great Wave Software	Crystal Paint	49.95	Creates crystalline patterns. Replay/redraw. Req. 512K.
Image Club Graphics	Pages	79.00	Template for invitations, menus, awards, certificates.
LaserWare, Inc.	LaserPaint	495.00	PostScript graphics/text for camera-ready artwork. Drawing; painting; writing; layout/paste-up; 4-color separations. Req. 512KE.
LaserWare, Inc.	LaserWorks	299.00	Laser-font editor. Produces fonts/graphic elements. Req. 1MB.
MacroMind	MacroMind Utility Disk	49.95	Collection of graphic utilities/DAs. Req. 512K.
Palomar Software, Inc.	Colorizer	49.95	Adds color to PICT documents; saves image to disk or prints. DA changes system color environment. Req. 1MB. For Mac II.
Silicon Beach Software	SuperPaint	149.95	Graphics editor w/paint, draw capabilities. 300-dpi bit-map editing. Req. 512K.
Solutions, Inc.	Glue	59.95	Prints to disk. Image saver/viewer converts graphics to images for integration w/other applns. E-mail, bulletin-board, or LAN transfers.
SuperMac Technology	Pixel Paint	300.00	Color, bit-mapped desktop presentation for Mac II w/large screen. To $500.
Symmetry Corporation	Picture Base	99.00	Art mgt. Creates graphics database. Req. 512K.
T/Maker Company	ClickArt Effects	49.95	MacPaint-enhancement tools. Rotates, slants, adds perspective, or distorts.

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Communications

Telecommunications may be defined as the electronic transfer of information, usually between computers and/or remote terminals. Typical data transfers occur over telephone lines, local-area networks, or other cabling systems. Their applications range from accessing an electronic information service, such as CompuServe, to sharing a LaserWriter with other users in an office.

To link a single computer with the outside world, you need a modem, telephone lines, and software to make your Mac act like a terminal.

Ways of Communicating

■ *Electronic mail* and messaging send unformatted (text only) messages in the standard ASCII code (American Standard for Computer Information Interchange) understood by virtually all computers. The ASCII format does not support special Macintosh characters like bullets, Greek letters, or letters with umlauts or accents. Text files are not checked for errors, so a noisy phone line can add typos to messages.

■ *File transfers* send fully formatted files. Error-checking protocols such as XModem (for Mac-to-Mac transfers) or Kermit (for many Mac-to-mainframe transfers) monitor transmission, because a single error can render the whole file useless. Mac-to-Mac files are made in a format called MacBinary, which transfers the file's name, type, creator, and other information as well as its text. Transferring the file through an intermediate non-Mac system can require binary hexadecimal (*binhex*) conversion to the other machine and retranslation to the receiving Mac. Most software now handles these format conversions automatically.

■ *Terminal emulation* makes a Macintosh look like a standard "dumb" terminal to the remote computer. Terminal-emulator software lets you enter data directly into a remote computer, but it is used more commonly to adapt a Mac for electronic mail and file transfers.

■ *Local-area networks* have dedicated wiring that allows multiple users in the same facility to use the same device, usually a LaserWriter. Special software is needed, though its presence may not be obvious; the software for shared printers is included in the System file and the printer drivers.

■ *File sharing* gives multiple users in one facility access to the same files via a local-area network. Some software, such as *AppleShare,* requires a Mac equipped with a hard disk on the network running as a *dedicated file server.* Other approaches, such as *TOPS* and *Hypernet,* offer *distributed* file serving by

dividing file-serving software among the networked Macs without a dedicated server.

■ *Disk serving,* facilitated by such products as Share and the IOmega Bernoulli Box 10+10, allows you to partition a hard disk into volumes. Each volume can then be accessed by different users simultaneously.

Hardware

Communications hardware requirements vary with their uses. A modem converts computer data into a form that can cross telephone wires. (Dedicated digital phone lines are so costly that only large organizations can afford them.) Macintosh modems have previously been external, but the Mac II and the SE can accept internal modems.

Speed, standards, and price are major factors in picking modems. The standard speeds are 300, 1200, and 2400 *baud* (which functionally means bits per second), although some 9600-baud modems have reached the market. Most modems now work at 1200 or 2400 baud (which is best for file transfers). Although some information services charge a premium for access at higher speeds, the cost per bit is almost always lower and the time savings significant. Standards are not firm for 9600 baud; if you need to send data that fast, the best approach is to pick matching modems. Prices are coming down, ranging from under $200 to nearly $1000, depending on baud rate.

The command codes used to control modem operation are a separate issue. The de facto standard is a set of commands developed by Hayes Microcomputer several years ago. Some communications software, such as Hayes's own *Smartcom II,* automatically uses the Hayes command set and won't work properly with incompatible modems; other terminal-emulation software, such as *Red Ryder, Microphone,* and *inTalk,* does not require precise Hayes compatibility.

Software

The range of telecommunications software is broad enough to meet virtually all needs, and programs vary widely in ease of use and flexibility. Some, such as *FModem* or *TermWorks,* are simple to use because they offer few choices and their defaults suffice for most ordinary needs. Others, like *Smartcom II,* combine a more friendly interface with power, but present an array of choices that can be bewildering. Users familiar with communications may prefer a program like *Red Ryder,* which provides extensive control without the overhead imposed by graphic interfaces.

More powerful programs, including *inTalk, Microphone, Red Ryder,* and *Smartcom II,* can automate communications by executing preprogrammed routines to log onto a service. *Microphone* and *Red Ryder* can even write a routine by recording your actions during a session.

Most communications software is for general purposes, but some programs (like *AppleLink* and Dow Jones's *StraightTalk*) are written for limited applications, such as connecting to specific services. Generally, the best buy is software versatile enough to do many tasks, unless you have specific requirements that such software can't satisfy.

Local-Area Networks

You need both special hardware and software for local-area networks, although basic needs can be met by standard Apple System software. The prime hardware choice is AppleTalk, which connects as many as 25 Macs. AppleTalk connectors plug into the Mac's printer port, interfacing with electronics already built in. AppleTalk cards are available also for IBM PCs and compatibles.

AppleTalk, first used to connect multiple Macs with a single LaserWriter, has simple software requirements: the *Control Panel* desk accessory to turn the network on, the appropriate printer driver, and some routines in the System file. New products allow sharing of modems, although costs make this most attractive for high-speed modems. Others products, like hardware servers from Solana Electronics and Abaton Technology, allow connection of multiple modems to an AppleTalk cable.

Sharing information and resources with personal computers, minicomputers, mainframes, and other Macintoshes

Computers on local-area networks run multiuser applications (such as database programs) that let them access files on the server. Most file-sharing software can do without a dedicated file server, and *TOPS* allows configurations that enable Macs and PCs to share files, though with limitations. You need software like *MacLink Plus* or Apple's *Data Exchange* to read formats for other PCs. Some programs, including Microsoft's *Word* and *Excel,* and Living Videotext's *More,* also have limited data-exchange capabilities, as do the desk accessories *Mock Terminal* and *SideKick.*

Trends

Terminal emulators are reasonably stable, with powerful programs available from discount houses for under $100. Modems are in transition, with 1200-baud models dropping in price, 2400 baud becoming commonplace, and higher speeds looming on the horizon. However, the appeal of raw speed is tempered by the lack of standards and by questions about phone-line quality, which sometimes can impair 2400-baud transmission. Apple and third parties are developing connections to the Ethernet backbone, for access to VAX and other mainframes.

Networks are booming, with file-serving software proliferating rapidly. The open architectures of the SE and Mac II should accelerate the trend, because they can accommodate cards to connect with local-area networks, such as the 10-megabaud Ethernet, that are much faster than AppleTalk. The growth of multiuser software also encourages network development. Yet hardware and software costs remain high enough to warrant caution before committing yourself to a network.

–Jeff Hecht

Vendor	Product	Price	Notes
Communications Software			
1st Desk Systems	1stGATE	495.00	Remote database/bulletin-board system. Req. 512K.
Aegis Development, Inc.	MacMail	39.95	E-mail system. Address book w/macros.
DA Systems, Inc.	DASnet	80.00	Distribution service for 18 E-mail systems. Monthly charge for bus., $80; for individuals, $4.50.
Dow Jones & Co., Inc.	Desktop Express	149.00	Icon-oriented com. program for MCI Mail.
Dow Jones & Co., Inc.	Dow Jones Spreadsheet Link	99.00	Links spreadsheets, News/Retrieval. Req. Straight Talk.
Dow Jones & Co., Inc.	Dow Jones Straight Talk	95.00	Auto-connect to News/Retrieval.
Free Soft	Red Ryder	40.00	Telecom. support for MacBinary, Kermit, Xmodem. Automates functions. Hayes-compatible. Req. 512K.
Free Soft	Red Ryder Host	60.00	Customizable bulletin-board system. Req. 512K, Hayes-compatible modem.
Interactive Network Technologies	InterMail	349.95	Integrated desktop com./E-mail system. Req. 512K, AppleTalk. $349.95 up.
Linkware Corp.	LinkWare MacConnection	300.00	Host-based software. Connects Mac w/IBM, DEC, HP, UNIX computers. Req. 512K. $300 up.
MicroGraphic Images	MegaTalk	99.50	E-mail software for AppleTalk. Enhanced features w/MegaScreen Video Systems. Req. 512K.
Peripheral Computers & Supplies, Inc.	TekPRINT	79.00	Corollary w/VersaTerm. Prints on HP-type plotters. Req. 512K.
Prometheus Products, Inc.	ProCom	49.00	Full text editor/macro generator.
Shana Enterprises	Macintosh Interactive Display System	99.00	Interactive demonstration terminal w/animation. For exhibits/trade shows. Req. 512K.
Software Ventures, Inc.	MicroPhone	149.00	Auto. scripting. Req. 512K, Hayes-compatible modem.
THINK Technologies, Inc.	InBox/Mac Personal Connection	125.00	Additional connection to AppleTalk network running InBox. Req. 512K, InBox/Mac starter kit.
THINK Technologies, Inc.	InBox/Mac Starter Kit	350.00	Message center/3 personal connections for AppleTalk; E-mail/file transfer. Req. 512K.
File Transfer/Conversion			
1st Desk Systems	1stPORT	295.00	File conversion; data com.; text editor; data transport.
Apple Computer, Inc.	AppleLine 3270 File Transfer	99.00	File transfer bet. IBM 3270/Mac. Req. FT/TSO or FT/CMS host-based file-transfer support software.
Apple Computer, Inc.	MacLink Plus	195.00	Mac/IBM PC file transfer/translation. Req. 512K.
Communications Research Group	Blast	150.00	ASCII/binary file transfer bet. systems using Blast. Req. 512K.
Computer Applications, Inc.	II in a Mac	149.95	Lets Apple II software run on Mac. Converts Apple II files. Req. 512K.
DataViz	MacLinkPlus/NBI	495.00	File transfer/translation. Built-in com. to NBI system. Req. 512K.
DataViz	MacLinkPlus/PC	195.00	File transfer/translation. Built-in PC com. Req. 512K.
DataViz	MacLinkPlus/Translators	195.00	File translator for Apple File Exchange Utility. Req. 512K.

Vendor	Product	Price	Notes
DataViz	MacLinkPlus/VS	350.00	File transfer/translation. Built-in com. to Wang VS. Req. 512K.
Diversified I/O, Inc.	LaserLink	79.95	Lets IBM PC/compatibles print to LaserWriter on AppleTalk.
Dove Computer Corp.	FastNet	call	Allows Mac to function as end node on VAX network.
General Computer Corp.	HyperNet	299.00	File-serving software. Permits sharing of hard disks, files, applns. Req. 512K, AppleTalk.
Kandu Software Corp.	CADMOVER	495.00	Reads IGES, MiniCAD, MacDraw files. IGES support includes multiple drawings. Req. 512K.
Menlo Business Systems, Inc.	MAX	1295.00	Untended file transfer bet. Tandem mainframe/local intelligent workstation or node. Req. 512K.
MICRO CAD/CAM, Inc.	IGES	500.00	Graphics translator/importer from nonMac systems. Req. 512K.*
MicroSolutions	MatchMaker	149.00	Interfaces IBM PC w/Mac ext. drive. Subdirectories supported on HFS diskettes.
Oceanside Software	ThinkTank-ReportTime	49.95	Converts ThinkTank files to word processor files; adds MORE labeling features.
Odesta Corp.	Helix VMX	2500.00	Lets DH II applns. run on DEC/VAX VMS w/Mac workstation. Req. dedicated Mac Plus to Mac II. $2500 up.
Phillips Software	File Converter	24.95	Searches/replaces text to 400K in 20 secs. Adds/deletes tabs, line feeds, spaces, more.
Tangent Technologies, Ltd.	PC MacBridge Plus	375.00	Short card/software. Allows IBM PC to share AppleTalk network and to print PostScript. Req. 256K.
Tangent Technologies, Ltd.	PC MacServe	100.00	IBM PC-based client for MacServe. Software, $100; software/card, $375.
Tangent Technologies, Ltd.	PC MacText	50.00	Converts IBM PC files to Mac files.
Tangent Technologies, Ltd.	Tangent Share	150.00	IBM PC-based AFP client for AppleShare. Req. 256K. Software/card, $350.
TeleTypesetting Co.	MicroSetter	995.00	Converts PostScript output from Mac applns. to nonPostScript typesetters.
THINK Technologies, Inc.	InBox/PC Personal Connection	195.00	Lets IBM PC com. w/Mac or IBM PC on AppleTalk running InBox.
TouchStone Corporation	DoubleTalk	100.00	Lets 2 programs run concurrently. Transfers IBM PC files to Mac while running other programs.
TouchStone Corporation	UNIHOST	395.00	Runs on UNIX-based machines as command server for PC Works or MacLine. $395-$995.
TouchStone Corporation	UNIHOST/VMS	1295.00	Runs on VAX under VMS as command server for PC Works or MacLine.
White Pine Software, Inc.	Reggie	99.00	Converts Mac graphics to DEC-compatible formats (Regis, SIXEL).
White Pine Software, Inc.	VMac S	399.00	Xmodem file transfer for VAX using MacBinary format. Multiuser, $999.

Vendor	Product	Price	Notes
LAN: Products and Services			
3Com Corp.	3+ for the Macintosh	1050.00	Network operating system. Lets Mac/IBM PC share files/printers. E-mail. Req. 512K. 5+ users, $2100.
3Com Corp.	3Server3	5995.00	Network server for peripheral and info. sharing/backup, com., coordination. Req. 512K.
Abaton Technology Corp.	MultiTalk	695.00	AppleTalk-port server. Expands network. Shares 3 asynchronous serial peripherals. Req. 512K.
Alisa System	TSSnet	329.00	Allows Mac to function as a DECnet node.
Apple Computer, Inc.	AppleShare File Server	799.00	Converts dedicated Mac/hard disk drive(s) into file server for AppleTalk. Req. 512KE.
Apple Computer, Inc.	AppleTalk Connector Kit	75.00	Connection/access to other computers/shared peripherals. Req. 2 Macs or MS-DOS w/AppleTalk PC cord.
Apple Computer, Inc.	EtherTalk Interface Card	699.00	Provides access to Ethernet network. For Mac II.
Centram Systems West, Inc.	TOPS	189.00	Distributed file server for Mac. Mixed-computer capability. Req. 512K.*
Centram Systems West, Inc.	TOPS Repeater	189.00	Increases AppleTalk-network flexibility. Retransmits incoming signals at full voltage.
Centram Systems West, Inc.	TOPS Star	1500.00	Enlarges AppleTalk network; transforms bus network to stars.
Corvus Systems, Inc.	Constellation III for Macintosh	495.00	Network operating system for Mac on OmniNet. Req. cabling.
Corvus Systems, Inc.	OmniNet	249.00	Transporter-network interface for Mac. OCS-II Bus Node Kit, $45 per new station hookup.
El duPont, Inc.	Fiber Optic LAN for AppleTalk	700.00	Converter box; wall plates; fiber-optic cabling; concentrator for star topology. Req. AppleTalk. $700-$1100 per node.
Farrallon Computing	PhoneNET System	1768.00	Extends AppleTalk up to several miles w/existing phone wires, connectors, cables, accessories. Repeater; Connector; Plus Connector; StarController.
Hayes Microcomputer Products, Inc.	InterBridge	799.00	Remote or local bridge for AppleTalk.
Infosphere	MacServe	250.00	File/printer-sharing software. Runs in background w/o dedicated hardware. Req. 512K, hard disk for server. $250 ea.
Infosphere	ComServe	195.00	Shares modems, plotters, other serial devices. Req. 512K. $195 ea.
Kinetics, Inc.	EtherSC	1250.00	SCSI Ethernet controller. Direct connection to Ethernet. Req. cable.
Kinetics, Inc.	FastPath	2500.00	AppleTalk-to-Ethernet gateway. Supports bridging, TCP/IP, connections to DEC/UNIX computers. Req. cables.
La Cie Ltd.	SilverServer	99.99	Volume server over AppleTalk or modem; modem server over AppleTalk.
Laser Connection	Q-talk	49.00	Connects IBM PCs/Macs to laser printers on AppleTalk.

Vendor	Product	Price	Notes
Lutzky-Baird Associates	UltraOffice	1500.00	UNIX host for info.-mgt. network. Lets Mac/PC share info./system resources. Req. 512K, UNIX Host. 1-9 Mac hookups, $195 ea.
Microfinancial Corp.	FLEXSERVE	299.00	Database server. Allows FLEXWARE applns. to share database w/VAX, IMB, Mac. Req. 512K, dedicated Mac.
Mirror Technologies	ModemShare	200.00	Software-based modem server for AppleTalk.
Northern Telecom, Inc.	Meridian SL-1	call	Integrated voice/data PBX. Req. 422 Interface.
Office Talk	OfficeTalk	50.00	International com./E-mail network. Req. 512K, 2 disk drives, modem. $50 up.
Pacer Software, Inc.	pcLINK	2000.00	Ethernet support for VAX (VMS/ULTRIX), Stratus, UNIX systems. Terminal emulator; file transfer. 5-user license.
Reach Technologies, Inc.	The Nucleus	1595.00	AppleShare-compatible file server. Req. 512K.
Relax Technology, Inc.	Backup 1	399.95	Memory backup; 300 watts; switches in 4-6 ms. Backup 2, $599.95.
Shiva Corp.	NetBridge	399.00	Connects 2 AppleTalk networks; Increases number of computers/division of networks.
Shiva Corp.	NetSerial X232	399.00	Serial port for AppleTalk-peripheral sharing. Req. 512KE.
Solana Electronics	C-Server	595.00	Connects serial devices to AppleTalk network. Free-standing node; 3 ports;19.2K baud. Req. 512K.
Solana Electronics	I-Server	695.00	AppleTalk bridge. Transparent to system. Req. 512K.
Solana Electronics	R-Server	595.00	Gateway for remote access; bridges networks; free-standing node; 19.2K baud. Req. 512K.
Sunol Systems, Inc.	Network Multiplexer	295.00	Gateway for multiple networks, including AppleTalk/ IBM PC-Net. Req. 512K.
Sunol Systems, Inc.	Sun Disk	1595.00	Large capacity HD/LAN including file-serving software. Interface cord optional. Req. 512K. $1595-$7495.
Videx, Inc.	Mail Center	299.00	Lets AppleTalk users send/receive mail. Req. 512K, 2 or more Macs on network.
Modems			
Anchor Automation, Inc.	Lightning 24	499.00	300/1200/2400 baud. Hayes-compatible. Req. RS232 cable.
Anchor Automation, Inc.	Signalman Express	399.00	300/1200 baud. Hayes-compatible. 'S' register status; help screen; 2 phone jacks. Req. RS232 cable.
Anchor Automation, Inc.	VolksModem 12	199.00	300/1200 baud. Auto-dial/answer. Bell 212A-compatible, pulse/tone dialing, 5 'S' registers. Req. Volks cable.
Apple Computer, Inc.	Apple Personal Modem	399.00	1200/300 baud. Hayes-compatible. Microphone. Req. 512K.
AST Research	AST 2X9600	1499.00	MNP data compression. Microphone software. Req. 512K.
AST Research	AST-1200	399.00	1200 baud. Hayes-compatible. Microphone software. Req. 512K.
AST Research	AST-2400	599.00	2400 baud. Hayes-compatible. Microphone software. Req. 512K.
BIZCOMP Corporation	IntelliModem 2400	499.00	300/1200/2400 baud. Ext. volume control, DIP switch, line-quality display. Req. cables, com. software.

Vendor	Product	Price	Notes
BIZCOMP Corporation	IntelliModem EXT	349.00	300/1200 baud. Ext. volume control, DIP switch, line-quality display. Req. cables, com. software.
Computer Friends, Inc.	Mercury Modem	149.00	300/1200 baud. Hayes-compatible. Call-progress detection; status lights; speaker.
Hayes Microcomputer Products, Inc.	Smartcom II for the Mac	149.00	File transfers; auto. execution of stored instructions; voice/data transmission; VT100/102, VT52, TTY emulation.
Hayes Microcomputer Products, Inc.	Smartmodem 300	199.00	Auto-dial/answer 0- to 300-bps modem. Req. Smartcom II.
Hayes Microcomputer Products, Inc.	Smartmodem 1200	449.00	Complete hardware/software com. Cable.
Hayes Microcomputer Products, Inc.	Smartmodem 2400	599.00	Auto-dial/answer 2400/1200 baud, 0- to 300-bps asynchronous/synchronous modem. Req. Smartcom II.
Hayes Microcomputer Products, Inc.	Smartmodem 9600	1299.00	Auto-dial/answer 9600-bps asynchronous/synchronous ext. modem. Req. Smartcom II.
MacProducts USA	Magic Modem	149.00	1200/300 baud. Hayes-compatible. Wall mount.
MacProducts USA	Magic Modem 1200	99.00	1200/300 baud. Hayes-compatible. Wall mount. 2400-baud version, $199.
Microcom, Inc.	AX\1200C	599.00	Supports data compression B11103 at 300 bps; B11212A at 1200 bps; CCITT V.22 at 1200 bps; more. Req. cable.
Microcom, Inc.	AX\2400	699.00	Same as AX\1200C plus CCITT V.22 at 2400 bps, MNP Level 4. Req. cable.
Microcom, Inc.	AX\2400C	799.00	Same as AX\2400 plus MNP Level 5. Req. cable.
Microcom, Inc.	AX\9624C	1399.00	Same as AX\2400 plus V.29, MNP Level 6. Req. cable.
Personal Computer Peripherals Corp.	Optional MacBottom Modem	200.00	300/1200 baud. Hayes-compatible. Auto-dial/answer; SCSI hard disk option. Req. 512K.
Prometheus Products, Inc.	MacFax	1195.00	Group 3 facsimile modem. Direct transmittal screen to FAX. Req. 512K.
Prometheus Products, Inc.	ProModem 1200 Expandable	349.00	1200-bps modem. 512K E-mail/security buffer optional. 2400-bps model, $499.
Prometheus Products, Inc.	ProModem 1200 G	249.00	300/1200/2400 baud. Hayes-compatible. Call-progress detection. 512K buffer optional.
Prometheus Products, Inc.	ProModem 2400	499.00	300/1200/2400 baud. Hayes-compatible. Call-progress detection. 512K buffer optional.
Prometheus Products, Inc.	ProModem 2400 G	399.00	300/1200/2400 baud. Hayes-compatible. Call-progress detection.
Prometheus Products, Inc.	ProModem 2400 SE	499.00	2400-bps int. modem for Mac SE. Req. 512K.
Shiva Corp.	NetModem V1200	599.00	1200 baud. Hayes-compatible. Shared over AppleTalk. Req. 512KE.
Visionary Electronics, Inc.	Visionary Megabyte	495.00	Memory buffer to send/receive messages; Xmodem transfer; more. Req. Hayes-compatible software.
Worthington Babcock, Inc.	Turbolink 1200	149.00	300/1200 baud. Hayes-compatible. W/software and cable, $179.

Vendor	Product	Price	Notes
Terminal Emulators			
Apple Computer, Inc.	AppleLine	1295.00	Coaxial adapter. Lets Mac double as IBM terminal.
Apple Computer, Inc.	MacTerminal	125.00	Mac-to-Mac transfer. Accesses mainframes, minicomputers, telecom. services. Req. Apple- or Hayes-compatible modem.
Avatar Technologies, Inc.	MacMainFrame	1195.00	Emulates IBM 3270 terminal. SE model, $795.
Centram Systems West, Inc.	TOPS Terminal	189.00	AppleTalk link to TCP/IP-based networks. Req. 512K.
Int'l Computer Consultants	MAC3000	150.00	Emulates HP2624, HP2392, DEC VT100, IBM3278, TTY terminals. Text/binary transfer.
Invention Software Corp.	Communications Extender	125.00	Initialization routines; serial-port mgt.; file-transfer protocol; serial-data capture; time-activity integration.
Kaz Business Systems	FrontEnd	120.00	Emulates Data General/VT100 terminal in Mac-like environment. Req. 512K. Req. Tandem connection.
Menlo Business Systems, Inc.	Mac Menlo	395.00	Terminal emulation w/Mac capabilities. Req. 512K.
Mesa Graphics	TextTerm+Graphics	195.00	Standard text/graphics terminal. Com. w/mainframes, minicomputers, bulletin boards, E-mail systems. Req. 512K.
Metaresearch, Inc.	GriffinTerminal	99.00	Emulates TEK 4012/VT100 terminals.
Metaresearch, Inc.	TekniColor	299.00	Emulates TEK 4012 or TEK 4100 terminal; color or b/w modes. Req. 512K, Super Chroma for color.
NetSolutions	Mac-3000	150.00	Emulates IBM 3278, DEC VT100, DEC VT52, TFY, HP-3000 terminals.
Palantir Software, Inc.	inTalk	195.00	Terminal emulation/personal com. Task automation.
Peripheral Computers & Supplies, Inc.	VersaTerm	99.00	Text/graphics terminal emulation/com. Req. 512K.
Peripheral Computers & Supplies, Inc.	VersaTerm PRO	295.00	Text/tektronix color-graphics terminal emulation/com. Req. 512K.
TouchStone Corporation	MacLine	145.00	VT100/52 ANSI or TTY terminal emulator. Bidirectional file transfer bet. IBM PC/Mac or UNIX. Req. 512K, serial port.
TouchStone Corporation	PC Works	195.00	VT100/52 ANSI or TTY terminal emulator. Bidirectional file transfer bet. IBM PC/Mac or UNIX. Req. 150K, serial port.
Tri-Data	Netway 1000A	3195.00	3274/3278 terminal emulator. Up to 16 users. Req. 512K, AppleTalk, or PhoneNet.
Tymlabs Corporation	Mac 2624	199.00	Emulates HP block mode CRTs. File transfer w/text; graphic conversion. Req. 512K. $199-$100 per user for 1-50+ users.
Walker Richer & Quinn	Reflection	199.00	Emulates HP 2392; background processing w/switcher; error checking.
White Pine Software, Inc.	Mac 240	199.00	DEC VT240 text/graphics terminal emulator. Req. 512K.

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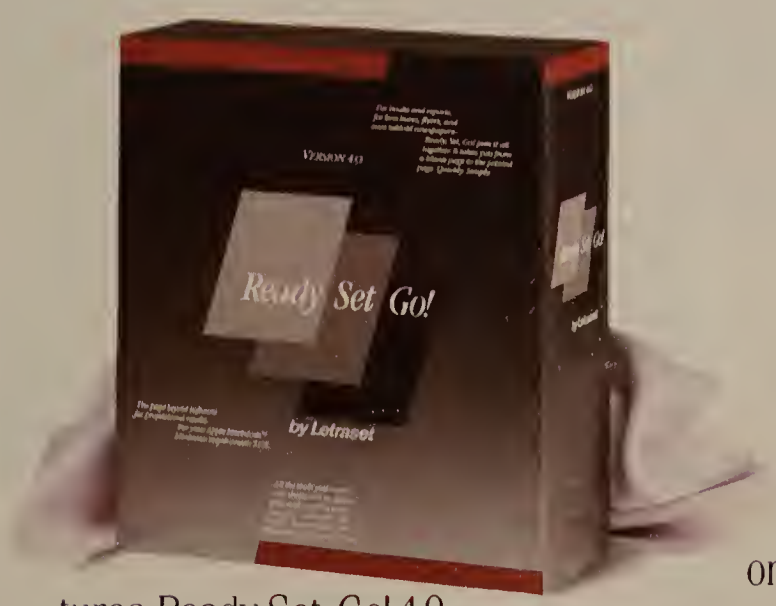

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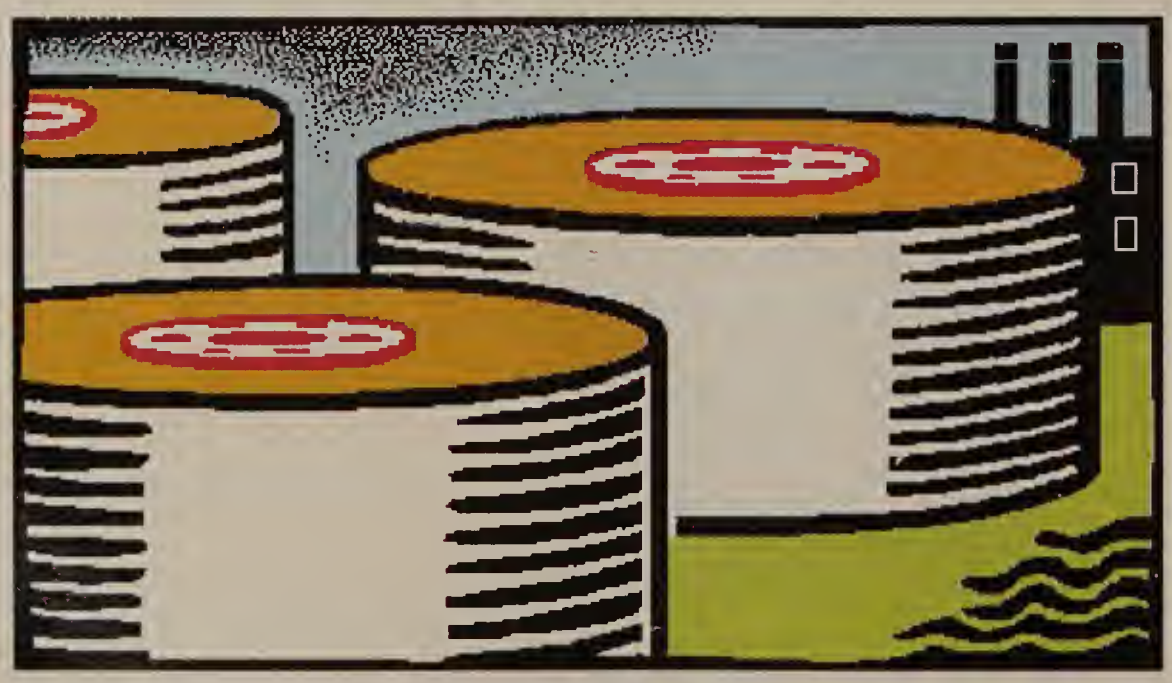
Storage



As the Macintosh has increased in power, mass storage devices have grown more popular. When HFS (Hierarchical File System) software and SCSI (Small Computer Systems Interface) hardware overcame the technical difficulties of making a hard disk for the Mac, many companies entered the market. Speed and convenience are the primary advantages of hard disks, which run faster than floppy disks and hold files too large for them. You can also avoid swapping floppy disks and can store all your applications and files in one place, while retrieving the space each floppy uses to store its individual System and application files.

There are essentially two types of storage devices. Archival storage–like WORM (Write Once, Read Many) devices, tape drives, or video disk players–is for large amounts of unmodifiable (*read only*) data, such as years of employee records or an encyclopedia. Modifiable Winchester hard disks are widely used for daily applications and tasks. Most devices store information magnetically, in the same way a cassette tape or a floppy disk does.

Types of Storage

Hard disk is now used informally to mean anything other than a floppy disk, but actually it is a set of ridged metal platters on which a magnetic head rides back and forth to write or read information. Hard disks are delicate because the head can crash into the platter very easily, causing damage akin to a record needle scratching a record. Most drives include a utility program that parks the heads to protect the disk, and the better ones do this automatically. Although most hard disks are fixed in their cases, some are removable; these, however, are relatively expensive and are also sensitive to shock.

Other devices serving the same function include Bernoulli drives, large floppy disks, and WORM drives, all of which store numerous files for both programs and data. Bernoulli technology is based on a thin floppy disk riding on a steady stream of air. Its removable cartridges are reasonably priced, so they can be used as large floppy disks. But Bernoulli devices themselves, such as the IOmega Bernoulli Box 10+10, are costly; moreover, the individual cartridges go bad and must be replaced more frequently than floppy disks.

Similar technology has been used to create large 3½-inch floppy disks like those from Jasmine and Bering. Like a Bernoulli system, this is good for people who create libraries of digitized art or sounds, and in an office where people share a hard disk, each person can have a large floppy for confidentiality

and convenience.

The advent of lasers and digital recording technology has given WORM drives, introduced by LoDown, the ability to write and read information to an optical disk, but they can't be modified. This may seem impractical because disks fill up quickly, but they can be removed and replaced, and they hold 10 to 80 times as much as a standard hard disk. However, WORM technology is expensive.

Like WORMs, a video disk player (similar to a VCR without a recording facility) can archive large amounts of data and offers easy, fast accessibility, but because it also interfaces with television and similar hardware, it is useful primarily for storing graphic and sound data. Video players have not yet evolved sufficiently for daily tasks with a Mac, but Apple's *HyperCard* should start an upsurge and refinement in them.

How to Choose

While you can get hard disks that hold from 10 to 900 megabytes (MB) of storage, 20MB is the most popular size, and a number of dependable products are available. However, additions in storage space generally give you more speed at a lower rate of price increase. For a 20MB hard disk, costs range from $570 to $1300. Jasmine offers some of the best ratios of price to performance, if you don't count additional software.

On the 128K and 512K Macs, hard disks are connected through the external drive port or the serial port. Apple, Paradise, and MacBottom still make useful serial drives, but unless you have a 128K or 512K, there is no reason to consider one. SCSI drives, the standard connection for storage devices on the Mac Plus and beyond, can access at a much faster rate. For older Macs, you can install an external SCSI port for about $100.

Since each type of Mac has a different SCSI driver on which the speed of the hard disk depends, initialize your disk on the machine you'll use it with; for example, you can't maximize the speed advantage of a Mac II with a hard disk initialized on a Plus. The DataFrame 20 and 40XB drives are exceptions to this rule. And not all hard disks work on every Macintosh without being reformatted. The DataFrame 20 comes close; it can move from the Plus to the SE or the Mac II with no drop in performance.

Another option is to place a hard disk inside the Mac, making it easier to transport. Apple approves installation of third-party devices in the SE and the II, both of which have strong power supplies designed to take the extra load. You can purchase internal hard disks for the earlier models, but they require the addition of a fan and may strain the power supply, leading to burnout. Fans are the source of most of the noise from storage devices, but this is not a primary consideration unless you prize silence (if so, you should search for a disk with an acceptable sound level).

Other Considerations

Before you choose a SCSI device, weigh its speed, price/performance ratio, warranty, and the reliability of its manufacturer (several companies have gone out of business in the recent past). Hard disks fail more often than floppy disks, making the warranty worth noting; three months has been the norm, but more vendors now offer a full year.

Also, some hard-disk configurations are incompatible with other hardware, so check carefully to make sure yours agree. And not all hard disks are fast enough for speedy networking or file serving.

Software is often sold separately. The DataFrame hard disks include print-spooling, backup, and disk-management utilities—which partially accounts for their higher price tags. Jasmine and others include public domain software.

Managing a Hard Disk

It's easy for a hard disk to become an electronic mess. The time you take to organize your folders will repay itself by making files easy to locate later. Utility programs such as Finder alternatives and catalogers can help you in this area.

When you access a document repeatedly on a hard disk, each time you save it the document fragments slightly, eventually reducing disk speed and efficiency. When this happens, utilities like *Disk Express* help reintegrate your files and retain disk speed.

Keep your data on hand and intact with hard disks, tape drives, removable media, and backup software

Frequent backup is necessary to protect against a hard disk's susceptibility to system crashes; after you've made significant investments of time and effort to load your applications and files, the last thing you want is to lose it all. It's best to back up the entire disk as well as original files. Fortunately, a tape drive can provide backup; usually one tape will hold the contents of an entire hard disk. A number of tape drives are now available, priced between $1300 and $1500.

The Future

The trend is toward offering more storage without corresponding price increases. In addition, the amount of information that can be stored on small floppy disks will grow. WORM drives should come down in price and become more practical for individual users. Beyond that looms the possibility of large optical disks that can be both written and erased; these may someday replace hard disks entirely.

With the Mac II's versatility and the coming of UNIX, the Mac is entering new markets, such as engineering and science, by connecting to mainframes. RAM caches will work with hard disks, like CMS's 320MB Power Tower (at the high end of the market, $13,000). Yet even if you don't require a huge amount of storage space, a proliferating variety of hard disks is available. The difficulty in choosing is due not to lack of options but to so many.

—Ben Calica

Vendor	Product	Price	Notes
Hard Disks			
Apple Computer, Inc.	Apple Hard Disks	1299.00	HD 20SC: 20MB ext. hard disk for Mac Plus to Mac II. 40MB, $1999; 80MB, $3199.
Apple Computer, Inc.	Macintosh Hard Disk 20	1199.00	20MB ext. hard disk for Mac 512K/Plus. Fits under Mac.
Apple Computer, Inc.	Macintosh Internal Hard Disks	999.00	20SC: 20MB int. hard disk for Mac SE/II. For Mac II only: 40MB, $1599; 80MB, $2699.
AST Research	AST 2000	1995.00	20MB ext. hard disk/20MB tape backup for Mac 512KE up. 70MB/60MB, $5295.
AST Research	FAST-20	1199.00	20MB ext. hard disk/20MB tape backup for Mac 512KE up. 70MB/60MB, $5295.
Bering Industries, Inc.	Totem 20MB	795.00	20MB ext. SCSI hard disk.
Bering Industries, Inc.	Totem Combination Hard Disk/Bernoulli	2295.00	20MB hard disk/20MB Bernoulli. 40MB/20MB, $2995; 80MB/20MB, $3995.
CMS Enhancements, Inc.	Compact S40	1495.00	40MB SCSI hard disk subsystem. 29 ms access, self-parking head.
CMS Enhancements, Inc.	Compact SC20a	795.00	Ext. 20MB SCSI hard disk subsystem. 65 ms access; cache.
CMS Enhancements, Inc.	Compact SC40a	1195.00	Ext. 40MB SCSI hard disk subsystem. 65 ms access; cache.
CMS Enhancements, Inc.	High Capacity Series	2995.00	140MB-320MB SCSI hard disk subsystems. 18 ms access. $2995-$5695.
CMS Enhancements, Inc.	MacStack Series	795.00	SD20, 65 ms access; SD43/80, 28 ms access; self-parking heads. Req. SCSI interface. $795-$1295.
CMS Enhancements, Inc.	PRO II/i Series	1195.00	Int. 40MB-80MB subsystems for Mac II. 28 ms access; self-parking heads. $1195-$1695.
CMS Enhancements, Inc.	PRO40-SE/i	1395.00	Int. 40MB hard disk subsystem for Mac SE. 29 ms access; self-parking heads.
CMS Enhancements, Inc.	PT320/T	12,995.00	320MB hard disk subsystem; 60MB tape backup; 4MB cache; .5 ms access. Req. SCSI interface.
CMS Enhancements, Inc.	PT640/T	16,995.00	640MB hard disk subsystem; 60MB tape backup; 4MB cache; .5 ms access time. Req. SCSI interface.
CMS Enhancements, Inc.	TS40	995.00	40MB SCSI tape backup subsystem.
Corvus Systems, Inc.	OmniDrive Network Server	2795.00	20MB hard disk w/built-in network server for OmniNet. 40MB, $4995; 70MB, $6795; 126MB, $8995.
Cutting Edge, Inc.	30 MG SCSI	599.00	30MB ext. hard disk. Daisy-chainable to 7 disks. Req. 512K.
First Class Peripherals	The Sider C46	1795.00	40MB SCSI hard disk w/60MB tape subsystem. Req. 1MB.
First Class Peripherals	The Sider Model D2	695.00	20MB SCSI hard disk. 40MB, $995.
FWB Software, Inc.	hammer Tower	15,000.00	600MB-1200MB chassis towers for Mac SE/II. 16 ms access. Backup/recovery software. To $19,000.
FWB Software, Inc.	hammer91	2695.00	91MB int. hard disk for Mac II. 18 ms access.
FWB Software, Inc.	hammer155	3695.00	155MB ext. SCSI hard disk for Mac II. 16.5 ms access. Backup/recovery software. 300MB, $4895.
General Computer Corp.	HyperDrive FI/40	1599.00	40MB int. hard disk for Mac SE w/utility software.

Vendor	Product	Price	Notes
General Computer Corp.	HyperDrive FX/20	1199.00	20MB ext. SCSI hard disk for Mac Plus to Mac II. Utility software. 40MB, $1799.
Jasmine Technologies, Inc.	BackPac 40	1299.00	Rear-mounting, 40MB ext. SCSI hard disk for Mac Plus.
Jasmine Technologies, Inc.	Direct Drive 20	649.00	20MB ext. SCSI hard disk. Fits under Mac. 40MB, $999; 50MB, $1159; 80MB, $1399; 160MB, $2899.
Jasmine Technologies, Inc.	InnerDrive 90/II	1499.00	Int. 90MB hard disk. 16 ms access. 9MB public-domain software/utilities included. For Mac II.
La Cie Ltd.	Cirrus 20D	599.00	20MB ext. hard disk w/password-supporting software. 30MB/40MB/60MB models avail.
La Cie Ltd.	Slot Machine 20	449.00	20MB int. hard disk for Mac SE w/com. software. 30MB/40MB/60MB models avail.
Levco	OverDrive 20	1399.00	20MB SCSI int. hard disk for Mac Plus. Daisy-chainable to 24 drives. 40MB, $2699.
LoDOWN	LoDOWN 20	995.00	20MB hard disk for Mac Platinum Plus to Mac II. 40MB, $1995; 60MB, $2495; 80MB, $3200; 155MB, $3995; 250MB, $6595.
LoDOWN	LoDOWN Combo 20-20	1795.00	20MB hard disk/20MB tape streamer. 20MB/50MB, $2195; 30MB/20MB, $2095; 30MB/50MB, $2495; 40MB/20MB, $2695; 40MB/50MB, $2995.
LoDOWN	Optical Combo 30-20	3665.00	30MB hard disk/20MB tape streamer w/CD ROM Drive. 30MB/50MB, $3890; 40MB/20MB, $4275; 40MB/50MB, $4500; 60MB/20MB, $4495; 60MB/50MB, $4720; 80MB/20MB, $5270; 80MB/50MB, $5495.
Logic Array	ProAPP 20 S	795.00	20MB ext. hard disk w/software. 40MB, $1295.
Logic Array	ProAPP 40 SEi	1295.00	Int. hard disk for Mac SE. Retains both floppy disk drives.
MacPeak Systems	CIERRA	2695.00	40MB SCSI hard disk/40MB tape backup. Mac 512K up.
MacPeak Systems	Plus-20	1095.00	20MB SCSI hard disk. 30MB, $1295; 50MB, $2195; 80MB, $2695; 160MB, $3995.
MacProducts USA	Magic 800K	199.00	Ext. disk drive. LED; disk eject; single or double sided.
MacProducts USA	Magic 20	449.00	Int. hard disk for Mac II w/utility backup software. 20MB-91MB, $449-$1495.
MacProducts USA	MagicDrive Series	649.00	Auto. error detection/correction. Req. 512K. 20MB-300MB, $649-$3799.
MASS MICRO	MASS STORAGE	589.00	20MB ext. hard disk. 3-way surge protect; shock absorbers. Built-in modem optional. 40MB, $799.
MDIdeas	HD-20	1095.00	20MB ext. SCSI hard disk. Backup software; cables. 30MB, $1595.
Micah Storage Systems	Micah Drive 20AT	1295.00	Int. hard disk for Mac 512K to Mac II. Adds third drive to Mac SE. 45MB, $1395; 90MB, $2395.
Micah Storage Systems	Micah Drive 30XT	1595.00	30MB SCSI ext. hard disk. Fits under Mac. 45MB, $1895; 90MB, $2595.
Micah Storage Systems	Micah Drive 45/40XT	2995.00	45MB ext. hard disk/40MB tape backup.
Microtech Peripherals, Inc.	Micro MAC 30	689.00	30MB Int. SCSI hard disk for Mac SE. 45MB, $899.

Vendor	Product	Price	Notes
Microtech Peripherals, Inc.	Nova 20	599.00	20MB SCSI hard disk for Mac Plus/SE. 30MB, $729; 50MB, $999.
Mirror Technologies	300 SE	1095.00	30MB int. hard disk w/software for Mac SE. Shock-mounted; ext. SCSI address switch. 45MB, $1395.
Mirror Technologies	53-II	1599.00	53MB int. hard disk for Mac II. 80MB, $2699.
Mirror Technologies	MagNet 20X	1095.00	20MB ext. SCSI hard disk w/software. 30MB, $1295; 40MB, $1795.
Mirror Technologies	MagNet 40/40	2795.00	40MB ext. hard disk/40MB tape backup. 85MB/40MB, $4595; 172MB/40MB, $6995; 340MB/40MB, $13,995.
Mirror Technologies	ProStation 1024	7995.00	Hard disk/tape backup for Mac II. Modularly expandable to 1000MB/240MB. $7995 up.
Mountain Computer, Inc.	FileSafe	1095.00	20MB ext. hard disk. 20MB-140MB avail.
Northern Telecom, Inc.	Memory Bank 261	13,000.00	261MB/75MB SCSI hard disk/tape backup.
Northern Telecom, Inc.	Memory Bank 485	17,000.00	485MB/75MB SCSI hard disk/tape backup.
NuDATA	DATA CELL 10R x 10R	2685.00	10MB SCSI hard disk/10MB removable media. Other models avail.
NuDATA	DATA CELL 40 x40T	2695.00	40MB SCSI hard disk/40MB tape backup for Mac 512K to Mac II. Software; ext. SCSI select; front switch.
NuDATA	GIGA CELL 250T	8250.00	250MB ext. SCSI hard disk subsystem/40MB tape backup. Software; ext. SCSI select. 330MB/40MB, $9450; 660MB/40MB, $17,100.
Palo Alto Microsystems	Whisper Drive 32	889.00	Ext. 32MB hard disk. Same footprint as Apple 800K drive. 3 1/2" format; self-parking heads.
Peripheral Land, Inc.	PL 20	995.00	SCSI hard disk. 20MB-230MB, $995-$6995.
Peripheral Land, Inc.	PL 20i	895.00	Int. hard disk for Mac SE. Includes ext. enclosure for 2nd floppy drive. 20MB-40MB, $895-$1295.
Personal Computer Peripherals Corp.	MacBottom SCSI HD21	1195.00	21MB SCSI hard disk. HFS backup/archive/restore; Finder; copy utility; spooler for ImageWriter/LaserWriter. 45MB, $1795.
Personal Computer Peripherals Corp.	MacBottom20	1195.00	20MB serial-interface hard disk for Mac 512K/Plus.
Priam Systems Division	MacDisk EM 40	1895.00	Ext. hard disk. 40MB-230MB, $1895-$3995.
Relax Technology, Inc.	H20/20T	1995.00	SCSI 20MB hard disk/20MB tape backup. Surge-protected. H40/60T, $2995; H80/60T, $3995.
Relax Technology, Inc.	H20P	1195.00	20MB ext. SCSI hard disk w/surge protection. 30MB, $1395; 40MB, $1595; 80MB, $1995; 150MB, $4395.
Relax Technology, Inc.	MacMate 20	995.00	20MB SCSI ext. hard disk. Vertical chassis. 40MB, $1495; 80MB, $1895.
Relax Technology, Inc.	SI 20	895.00	20MB embedded SCSI drive for Mac SE/II. 30MB, $1095; 40MB, $1395; 80MB, $1795; 150MB (Mac II only), $3995.
Rely Technologies, Inc.	Rely 65MB	1995.00	65MB ext. hard disk. 110MB, $2595; 240MB, $4495.
Rodime Systems	20 PLUS	1195.00	20MB ext. SCSI hard disk. Daisy-chainable. 28 ms access. 45MB, $1595.

Vendor	Product	Price	Notes
Rodime Systems	20i PLUS	1295.00	20MB int. SCSI hard disks for Mac Plus. 45MB, $1695.
Rodime Systems	450 RX	1595.00	3 1/2" 45MB int. disk. 28 ms access. For Mac SE/II.
Rodime Systems	1000 RX	2995.00	5 1/4" 100MB int. hard disk for Mac II. 28 ms access. 140MB, $3495.
SPECTRA Micro Development	Mac SE Internal 20 Hard Drive Expansion Kit	895.00	20MB int. hard disk kit for Mac SE. 40MB, $1295; 80MB,$1695.
SPECTRA Micro Development	SPECTRA Drive 20	662.50	Portable 20MB SCSI hard disk. Power control, surge protection. 40MB, $1295. 80MB, $1695.
SPECTRA Micro Development	SPECTRA Professional	995.00	20MB ext. SCSI hard disk subsystem. Up to 500MB avail.
Sunol Systems, Inc.	Sun Streak	1195.00	30MB SCSI hard disk. Req. SCSI interface. 45MB, $1995; 70MB, $2495; 110MB, $2795; 183MB, $5995; 245MB, $7495.
SuperMac Technology	DataFrame 30	995.00	30MB ext. SCSI hard disk.
SuperMac Technology	XP 30	1195.00	30MB ext. SCSI hard disk. 60MB, $1695; 105MB, $2695; 150MB, $3295.
SuperMac Technology	XP 60+40	2595.00	60MB ext. SCSI hard disk/40MB tape backup.
Supra Corp.	SupraDrive 20	799.00	20MB ext. hard disk for Mac Plus. 30MB, $995; 60MB, $1995; 250MB, $3995.
Univation, Inc.	SlimLine 20	1495.00	20MB ext. hard disk subsystem. Fits under Mac Plus. Req. SCSI interface. 30MB, $1795; 40MB, $2195.
Warp Nine Engineering, Inc.	P20i	499.00	20MB int. hard disk for Mac SE. 30MB, $649; 45MB, $899. Prices reflect $100 credit for floppy-drive trade.
Warp Nine Engineering, Inc.	Photon 20	569.00	20MB SCSI hard disk. HFS/MFS compatible. Daisy-chainable; fan-cooled. 30MB, $789; 40MB, $949.
Warp Nine Engineering, Inc.	Photon 2001	1399.00	20MB SCSI hard disk/20MB tape backup.
Western Computer, Inc.	BIG MAC TWINPACK	1299.00	20 MB SCSI hard disk/20MB tape backup for Mac Plus.
Removable Media			
Apple Computer, Inc.	Apple 3.5 Drive	399.00	800K ext. drive for Mac 512KE/Plus/SE.
Apple Computer, Inc.	Apple PC 5.25 Drive	399.00	Lets Mac SE/II or MS-DOS users read/write from/to each other's files. Req. Mac SE or Mac II PC Drive Card.
Apple Computer, Inc.	Macintosh 800K External Drive	399.00	Ext. 3 1/2" floppy disk drive for Mac 512K up.
Apple Computer, Inc.	Macintosh Internal 800K Disk Drive	299.00	3 1/2" floppy int. disk drive for Mac II.
Bering Industries, Inc.	Totem 20MB Removable Bernoulli	1495.00	20MB SCSI Bernoulli drive. 5 1/4" cartridges. Dual 20MB, $2295.
Central Point Software	Central Point 800K	225.00	Ext. drive for Mac 512K up.
Century Data Systems	PhD	5495.00	82MB removable/fixed-disk subsystem w/20.5MB removable cartridges.
Cutting Edge, Inc.	800K Drive	185.00	800K ext. floppy disk drive.
IOMEGA Corp.	Bernoulli Box A 110 H-APLS	1295.00	10MB online capacity; hard disk performance. 20MB, $1695.
IOMEGA Corp.	Bernoulli Box A 210 H-APLS	1995.00	Dual drive; 20MB; hard disk performance. 40MB, $2595.

Vendor	Product	Price	Notes
Jasmine Technologies, Inc.	MegaDrive	999.00	Ext. SCSI removable-media drive. 10MB hard-sectored cartridges. Reinitializes w/o data loss.
LoDOWN	CD ROM Development System	11,585.00	600MB CD ROM drive; 70 min. audio; 400MB WORM; 155MB hard disk. For Mac Platinum Plus to Mac II.
LoDOWN	CD ROM Drive	1595.00	600MB CD ROM drive w/70 min. audio.
LoDOWN	WORM 400	6150.00	Write Once Read Many..Laser tech. WORM 800, $8245.
Microtech Peripherals, Inc.	Micro MAC 800	189.00	800K ext. floppy disk drive.
Mirror Technologies	Mirror Magnum 800AE	295.00	800K ext. floppy disk drive.
Mountain Computer, Inc.	Micro Bernoullis	1895.00	20MB single Bernoulli. Zero footprint. Dual drive, $2795.
Mountain Computer, Inc.	Micro Bernoullis Combo	3395.00	20MB hard disk/Bernoulli. 40MB/80MB avail. To $4495.
NuDATA	DATA CELL 10R	1385.00	10MB SCSI removable-media drive. Mac 512K to Mac II. 20MB, $1095; 40MB, $1695; 80MB, $2195; 125MB, $3995; 150MB, $4950.
Peripheral Land, Inc.	Infinity Drive 1	1095.00	10MB ext. floppy disk system. Reads IBM PC 1.2MB/360K floppies. 75 ms access. Req. 512K.
Peripheral Land, Inc.	Infinity Drive 1	1295.00	10MB hard-shell media. 65 ms access.
Peripheral Land, Inc.	Infinity, Infinity II	1095.00	10MB system. Reads MS-DOS files from 360K/1.2MB disks. Req. 512K. Infinity II (hardshell media), $1295.
PKI, Inc.	Mac 800K	195.00	800K ext. floppy disk drive.
SuperMac Technology	XP 60+B	3495.00	60MB ext. SCSI hard disk/20MB removable Bernoulli.
Warp Nine Engineering, Inc.	Phaser 800K	189.00	HFS-compatible. Distinguishes bet. 400K/800K disks.
Tape Backup Units			
Apple Computer, Inc.	Apple Tape Backup 40SC	1499.00	40MB Volume/file backup/restore. Req. SCSI interface/ Apple Hard Disk or Macintosh Internal Hard Disk.
Blackhole Technology, Inc.	MacTape	8995.00	9-track, quad-density tape drive w/software driver to backup/retrieve files.
First Class Peripherals	The Sider Model T6	995.00	60MB SCSI tape backup system.
General Computer Corp.	HyperTape	1399.00	40MB ext. SCSI tape backup for Mac Plus to Mac II. Backs up/restores disks or files.
La Cie Ltd.	Cirrus 40T	899.00	40MB tape backup.
LoDOWN	LoDOWN T20	945.00	22MB/27MB tape streamer. 50MB/60MB tape streamer, $1295.
MDIdeas	TDBK-20+	1095.00	20MB SCSI tape backup. 45MB, $1295.
Mirror Technologies	Magnum Tape 20	1195.00	20MB tape backup w/software. 40MB, $1395.
NuDATA	DATA FILE 40	1395.00	40MB SCSI tape backup subsystem. Software; ext. SCSI select; front-mount switch.
Peak Systems	PLUS-20T	995.00	20MB SCSI tape backup. 60MB, $1295.
Peripheral Land, Inc.	MacBack+20	995.00	20MB volume, file, incremental backup/recovery tape backup system. Req. 512K. 60MB, $1495.
Relax Technology, Inc.	Tape20-P	1295.00	Ext. fan-cooled 20MB tape backup w/surge protection. Req. SCSI interface. 60MB, $1595.

Vendor	Product	Price	Notes
SPECTRA Micro Development	SPECTRA Tape Drive	995.00	20MB SCSI portable tape backup. Surge-protected.
SuperMac Technology	DataStream	1295.00	Tape backup/restore unit for any Mac hard disk.
Tecmar, Inc.	QT-Mac 40	1495.00	40MB portable SCSI tape backup. Auto. operation. Req. Mac 512K.
Warp Nine Engineering, Inc.	Transporter 20	795.00	20MB SCSI tape backup. Volume, file, or incremental.
Whisper Microcomputer Products	Whisper 20	645.00	Ext. SCSI hard disk w/backup, software. 20MB, $645; 30MB, $895; 40MB, $1295.
Whisper Microcomputer Products	Whisper Tape	795.00	Tape backup system.

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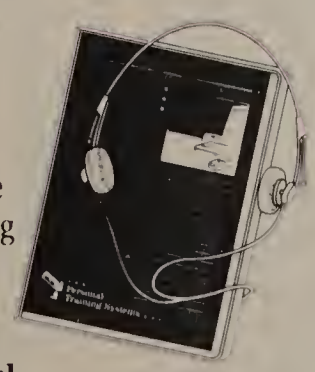

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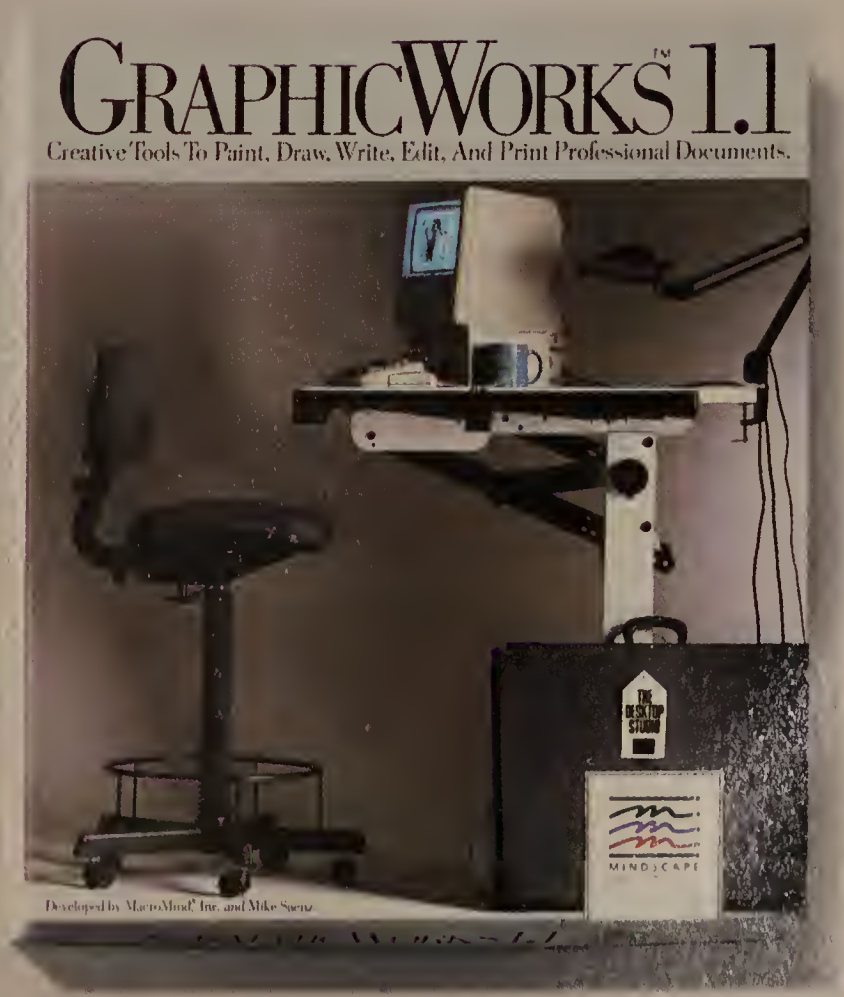

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Systems and Memory

The Mac 128K and 512K handle basic applications in word processing, file management, and simple graphics. To get the most out of today's powerful software, however, you need at least 512K of memory (preferably a megabyte), 128K ROM, and two 800K disk drives (or a 20MB SCSI hard disk). For many current applications, you need a Plus, an SE, or a Mac II. If you bought a Mac early on, you can upgrade to benefit from the latest advances.

Four types of upgrades–ROMs and disk drives, added memory, coprocessors and CPUs, and I/O cards–can give you almost as much power as a Mac II. For word processing and limited desktop publishing, you do not need a processor upgrade; an inexpensive memory upgrade may be sufficient. If you do a lot of numerical calculations or use CAD on your Mac, you may want a numeric coprocessor and additional memory. For engineering and scientific simulations, complex graphics, or special effects, you could use all three: memory, processor, and coprocessor upgrades. If connectivity to other computers is your main focus, you can buy cards that allow your Mac to emulate an IBM PC, exchange data, connect to UNIX machines, or connect and control laboratory instruments.

ROMs and Drives

In 1986, the Mac Plus introduced a new 128K ROM and an 800K internal disk drive–twice as large as those in the 128K and 512K Macs. This combination upgrade from Apple is one of the cheapest and most essential. Without 128K ROM, you cannot use stable hierarchical filing systems (HFS) or file servers, nor can you connect to hard disks of more than 32MB. While the Mac II and SE have 256K ROM, no upgrade to that is currently available from 128K ROM.

Memory

With more memory, applications run faster, and more documents and desk accessories can be open simultaneously. You can set up a RAM disk or disk cache (either Apple cache in the control panel or Turbocharger from Nevins) on your Mac with extra memory to increase speed even further. You can add up to 4MB directly into an SE or Plus, and 8MB into a Mac II.

Both Apple and third-party vendors offer memory upgrades; though Apple's prices are considerably higher, their upgrades are dependable and always compatible. Along with price and the vendor's reputation, these are important considerations. With more memory, you need a fan to offset the additional heat inside the Mac case; look for upgrades that install a fan rather than mounting an external fan on top of the case.

Some memory upgrades include SCSI ports for your 512K. Vendors like SuperMac go beyond this, offering an extra 68000 processor to reduce the

workload of your main processor, in addition to a 2MB memory upgrade, a SCSI port, and a fan, all of which make the Mac run 15 to 20 percent faster than a Mac Plus.

Processors and Coprocessors

The Mac II has a more powerful processor than the Plus and the SE. Its 68020 processor allows applications to run faster, accesses more memory, and works well with other processors to deliver high performance. When coupled with the 68881 "math chip," it can perform numerical calculations up to 200 times faster than a Plus. When the 68851 page memory management unit (PMMU) is added to Mac II, you can run a UNIX operating system and address more than 8MB of memory. Adding a graphics coprocessor or 80286 coprocessor to the Mac II enables you to run IBM applications in a window.

You can also upgrade your processor and add coprocessors to the Plus or SE to create a workhorse like the Mac II. Inserting a card from AST in the SE also allows you to run IBM applications. Or you can buy an accelerator card with 68020, 68881, or 68851 PMMU chips to change the SE into a "portable Mac II."

Unfortunately, standards in SE cards are still emerging. Since the SE has only one slot, decide carefully which coprocessor or processor upgrade you want. Most accelerator upgrades allow you to connect to at least one large screen monitor. If you prefer a particular monitor, you may have to choose an accelerator board compatible with it, or vice versa.

You can also add the 68020/68881 combination and an extra megabyte of memory to a Mac Plus for under $2000 from Levco, GCC, Peak, Network Specialties, or Radius. Just make sure that your upgrade comes with a fan and that the power supply is adjusted to correct specifications. Again, weigh price/performance ratios, compatibility, warranty, and stability of the vendor before you buy.

All power upgrades have disadvantages. Some applications, desk accessories, and utilities will not run on a Mac II, Prodigy, or other system upgraded to higher clock speed. Mac Plus upgrades strain its power supply; unless you can reduce the load, failure is inevitable. Since Apple does not authorize additions to the Plus, all external upgrades must be removed before your Mac is serviced by an official dealer.

I/O Connectivity

Proper input/output connections and protocols are imperative to connect a Mac to laboratory equipment for control and data acquisition needs, to DEC or IBM mainframes, or to other personal computers. Unlike the earlier Macs, the Plus has a SCSI port for high-speed hard disk connections; you can daisy-chain up to seven SCSI devices to a Mac Plus. To read and write IBM data rather than run IBM applications, options are available. If you are serious about having UNIX capability, it's best to buy a Mac II, due to the size of Apple's UNIX operating system. But by the time you read this, UNIX may be available from third parties.

For connectivity to laboratory instrumentation, National Instruments, MacADIOS from GW Instruments, and Reed College provide interface boxes. The National Instruments card for the Mac SE provides an industry-standard IEEE 488 port to which laboratory instruments can be directly connected. To connect the Macintosh to other computer systems, such as DEC and IBM mainframes, several universities and industries use Ethernet connections, which are available through Apple, Kinetics, Dove, and other third parties.

Monitors

Several manufacturers have introduced large screens that can be connected to the Plus, SE, or Mac II. Some of these have higher resolution than the Mac screen itself, and some are large enough to show two actual-size 8½- by 11-inch pages. Large color screens are also available for use with the Mac II. While the higher resolution is nice on a bigger screen, unless the screen font and cursor sizes are increased, reading is difficult. For serious desktop publishing or CAD, big screens are very helpful but cost $2000 to $3000.

Products that add power and efficiency to your hardware and software environment

For desktop publishing, you may want full-page display; for spreadsheet and CAD applications, a display that can show a page horizontally may be right. Make sure that your applications and hardware are compatible with the display you choose.

Portables

Some portable Macs are available with LCD or electroluminescent displays, but they weigh as much as the Mac Plus itself. Currently Dynamac, Colby, and Intelitec offer portables, but high price and weight make each one a dubious choice. A year from now, we should see other lightweight portables.

The Future

True multitasking of applications is not yet available on the Macintosh. To run applications that now take hours and days to calculate instead of seconds, another approach, called *multiprocessing,* can be used.

The Mac II's processor-independent Nubus architecture gives it a lot of growth potential as a workstation. Currently in the works are several graphics and sound accelerators, which will make the Mac II faster and enable it to do tasks like graphics animation and architectural rendering, and to enter new areas like broadcast graphics. Network cards will enable you to emulate and connect to any computer you wish.

Choosing an upgrade can be a confusing and expensive process. Take your time in deciding, get good advice, and above all, know how much power you really need before you take the plunge.

—Prasad Kaipa

Vendor	Product	Price	Notes
Buffers and Spoolers			
Apple Computer, Inc.	Apple LaserShare Printer Spooler	299.00	Off-loads LaserWriter printing queue to server.
Cortland Computer	BackPrint	29.00	Spooler. Req. 512K.
DataSpace	LaserServer	2295.00	Spooler. Holds 32 jobs. Expandable to 12MB.
DataSpace	Mac Buffer	449.00	256K buffer. Expandable to 1MB.
Ergotron, Inc.	MacBuffer LW	1895.00	Shares 1MB-4MB storage over AppleTalk.
Infosphere	LaserServe	95.00	Personal print-serving software. Speeds AppleTalk LaserWriter/ImageWriter printing. 5 users, $295.
MacPeak Systems	Plus Spooler	795.00	512K hardware laser spooler. Standalone, $995.
Menlo Business Systems, Inc.	Spool AT	295.00	Allows Tandem-file printing on LaserWriter. Host unit, $995. Req. 1 host/Mac unit per LAN.
NuDATA	Cell Spool	1375.00	512K hardware print spooler. 20MB, $2215.
SuperMac Technology	SuperLaserSpool	149.95	Background spooler for LaserWriter. Multiuser, $395.
SuperMac Technology	SuperSpool	74.95	Background spooler for ImageWriter.
THINK Technologies, Inc.	LaserSpeed	495.00	Multiuser LaserWriter-compatible spooler. 1 user, $99.
Warp Nine Engineering, Inc.	Laser Sprint	59.95	Spooler for LaserWriter.
Warp Nine Engineering, Inc.	Print Sprint	29.95	Spooler for ImageWriter.
Memory Upgrades			
Apple Computer, Inc.	Apple 1MB Memory Expansion Kit	349.00	1MB (4K-256K SIMMs) upgrade for Mac II.
Apple Computer, Inc.	Apple 2MB Memory Expansion Kit	999.00	2MB (two 1MB SIMMs) upgrade for Mac Plus to Mac II.
Apple Computer, Inc.	Macintosh Plus Logic Board Kit	799.00	Expands Mac 128K to 1MB w/option for 4MB. SCSI port. Mac 512K kit, $599.
AST Research	AST-RM4	899.00	1MB expansion board for Mac II. 4MB, $1799.
Beck-Tech	MacMegabytes	129.00	1MB upgrade kit for Mac 128K/512K. RAM-disk software. Compatible w/HFS ROMs. User-installable.
Dove Computer Corp.	MacSnap	149.00	Upgrades Mac 128K to 512K. Productivity-enhancement upgrades avail. for all Macs. 8MB Mac II upgrade, $3998.
Levco	One Plus One	1274.00	2MB upgrade w/fan for Mac Plus. 4MB, $1798.
MacDoctor Electronics	Brainstorm	330.00	1MB upgrade. 1MB-4MB planned-expansion pathway. Plug-in memory modules avail.
MacDoctor Electronics	MacDoctor 512	169.00	Upgrades Mac 128K to 512K. Gold-plated open-frame socket.
MacMemory, Inc.	MaxPlus 2x4-S	899.00	Low-profile 2MB SIMM upgrade for Mac Plus to Mac II or TurboMax-equipped Macs. (Price subject to change.)
MacMemory, Inc.	MaxPlus Mega	499.00	2MB addition for Mac Plus. Low-power CMOS chips.
MacPeak Systems	Plus-RAM	895.00	2MB SIMMs w/surface mount for Mac Plus.
MacProducts USA	2MB Expansion Board	175.00	2MB upgrade. Low-power 1MB CMOS chips.
MacProducts USA	Magic 1MB SIMMs	249.00	1MB upgrade for Mac Plus to Mac II.

Vendor	Product	Price	Notes
MacProducts USA	Magic Memory Upgrade	99.00	Upgrades Mac 128K to 512K. Also: 512K to 1MB, $159; 128K to 1MB, $259. Doesn't affect Apple warranty.
MASS MICRO	MASS MICRO	699.00	2MB upgrade for Mac SE/II.
MASS MICRO	MASS PLUS	299.00	2MB upgrade for Mac Plus.
National Semiconductor Corp.	NS8/16-4B	1975.00	4MB NuBus upgrade for Mac II. Req. NS8/16-8E card, $3400. 8MB, $3595; 12MB, $5495; 16MB, $6995.
OpenMac Enterprises	Ram Series	599.00	2MB upgrade for Mac Plus/SE. 4MB upgrade for Mac Plus to Mac II, $999. Surface-mount models avail.
OpenMac Enterprises	RamPlus	299.00	2MB upgrade for Mac Plus. 4MB, $799.
SuperMac Technology	Enhance	949.00	Converts Mac 512K/512KE to 2MB Mac Plus.
SuperMac Technology	SuperRam 2	499.00	2MB upgrade for Mac Plus. 4MB, $899.
Warp Nine Engineering, Inc.	DataRam	259.00	2MB upgrade for Mac Plus.
Warp Nine Engineering, Inc.	MonsterRam	595.00	2.5MB upgrade for Mac Plus. For use w/int. hard disk.
Warp Nine Engineering, Inc.	WarpRam	179.00	1MB upgrade for Mac 512K/512KE.
Monitors			
Apple Computer, Inc.	Apple Color High-Resolution RGB Monitor	999.00	13" Trinitron CRT. 640 x 480 pixel res.; analog input; 66.7-Hz refresh rate. Req. Mac SE or Mac II Video Card.
Apple Computer, Inc.	Apple High-Resolution Monochrome Monitor	399.00	Flat, 12" CRT. 640 x 480 pixel res. Analog input; antiglare screen. Req. Mac SE or Mac II Video Card.
E-Machines, Inc.	The Big Picture	1995.00	82 pixels per in.; 17" monochrome display. Allows simultaneous display of Mac screen. Mac Plus to Mac II.
Logic Array	Eyesaver 14	395.00	14" Mac monitor. Tilts and swivels.
Micah Storage Systems	Micah Vision II	4690.00	21" color monitor/video card.
Micah Storage Systems	Micah Vision Video System	1995.00	Video card/monitor. Allows multiple-monitor use.
MicroGraphic Images	MegaScreen 2001	1995.00	19 1/2" monitor. 1024 x 900 pixel res.; dual-screen capability. For Mac 512KE to Mac SE. $1995 up.
Moniterm Corp.	Viking 1	1995.00	19" screen for Mac SE. 1280 x 960 pixel res. 3 desktop publishing modes.
National Data Systems	MacMonitors/Projectors	1095.00	17" high-res. monochrome w/antiglare, white phosphor, var. scan. For presentations. 23" model, $1295.
NEC Information Systems	MultiSync	899.00	14" color monitor for Mac II. 800 x 560 pixel res.; 7-way text switch.
Network Specialties	Hi-Top	995.00	15" monitor. 720 x 900 pixel res.; displays 8 1/2" x 11" image.
Network Specialties	Longfellow	1795.00	720 x 900 pixel res. full-page display. 80-dpi interface.
Network Specialties	Stretch Projector!	1799.00	640 x 400 pixel res. 13" display screen for projectors.
Network Specialties	Stretch Screen!	1995.00	1024 x 1024 pixel res., 20" screen; tilt/swivel base; 64-kHz scan rate. For desktop publishing.
New Image Technology, Inc.	V-Screen	995.00	15" portrait-style monitor for Mac SE.

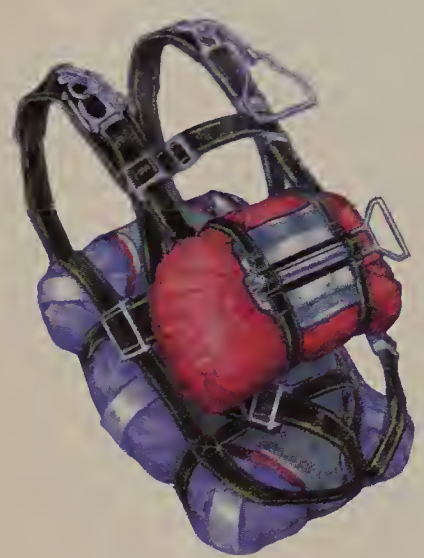
Vendor	Product	Price	Notes
Personal Computer Peripherals Corp.	PCPC II	4995.00	19" color monitor. 1024 x 768 pixel res.; 256 simultaneous colors. Includes display, board, cable.
Radius, Inc.	Radius Full Page Display	1995.00	Allows full view of 8 1/2" x 11" document. Req. 512KE.
Sigma Designs	LaserView Display System	1795.00	15" monochrome monitor for Mac SE/II. 1664 x 1200 or 832 x 600 pixel (dual) res. 19", $2295. Req. 512K.
SuperMac Technology	SuperMac Color Monitor	2995.00	19" high-res. color monitor for use w/Spectrum.
SuperMac Technology	SuperMac Monochrome Monitor	1495.00	19" high-res. b/w monitor for use w/Graphix or Superview.
SuperMac Technology	SuperMac Trinitron	2495.00	16" Trinitron high-res. color monitor for use w/Spectrum. 19", $3695.
Portable Macs			
Colby Systems Corp.	Colby Lap-Mac	5000.00	Includes Mac Plus CPU; 1MB RAM; 800K drive. Weighs 15.9 lbs. 10.5" diagonal gas plasma screen.
Dynamac Computer Products, Inc.	Dynamac	4995.00	Includes 1MB RAM; 800K drive; E-Machine interface; 640 x 400 pixel res., flat electroluminescent screen.
System Upgrades			
Apple Computer, Inc.	AppleTalk PC Card	399.00	MS-DOS compatibility. LaserWriter access.
Apple Computer, Inc.	Mac II PC Drive Card	129.00	Allows Mac II/MS-DOS compatibility.
Apple Computer, Inc.	Mac Plus Disk Drive Kit	299.00	Doubles disk capacity/increases speed. System software.
Apple Computer, Inc.	Macintosh II Video Card	499.00	Simultaneous display of up to 16 colors or levels of gray. Expansion kit: 256 colors or levels of gray, $149.
Apple Computer, Inc.	Macintosh SE-Bus Drive Card	129.00	Allows Mac SE/MS-DOS compatibility.
AST Research	AST-ICP	949.00	Intelligent com. processor for Mac II. Runs under UNIX.
AST Research	MAC286	1499.00	MS-DOS coprocessor for Mac II.
AST Research	MAC86	599.00	MS-DOS coprocessor board for Mac SE. Req. 1MB.
Blue Whale Technologies	Laser Accelerator Board	2195.00	Accelerator/memory-expansion board. Speeds printing 200%-500%; adds 3MB RAM to LaserWriter.
General Computer Corp.	HyperCharger 020	1499.00	Processor-enhancement board for Mac SE. 6-mHz, 32-bit 68020 microprocessor. 68881 math coprocessor, $1699.
Kinetics, Inc.	EtherPort SE	850.00	Internal option card for Mac SE. Direct connection to Ethernet.
Levco	Levco Prodigy 4	3499.00	68020-based upgrade for Mac128K to Mac Plus. 4MB; 68881 coprocessor; fan/power supply.
Levco	Levco Prodigy Prime	1899.00	68020-based upgrade for Mac Plus. 2MB, $2399; 4MB, $3199. 68881/68851 coprocessors optional.
Levco	Levco Prodigy SE	1499.00	68020-based upgrade for Mac SE. 2MB, $1999; 4MB, $2799. 68881/68851 coprocessors optional.
Levco	MonsterMac	920.00	2MB upgrade; SCSI port; fan. Increases speed 25%. Mac 128K/512K.
Levco	TransLink	19.95	Expandable accelerator. Uses parallel processing. Req. 512K. For Mac II, $24.95.

Vendor	Product	Price	Notes
MacMemory, Inc.	TurboMax	1499.00	Multifunction accelerator board for Mac 512KE/Plus. 68881 coprocessor, $399; E-Machine Adapter Kit, $149; TurboDrive 40, $1999.
MacPeak Systems	Orion	1995.00	68020 accelerator board w/2MB RAM for Mac SE. 68881 coprocessor, monitor card (Galaxy LS) optional.
MacProducts USA	Magic 68020 Upgrade	495.00	Upgrade for Mac 512K. W/floating-point coprocessor, $695.
MacProducts USA	Magic SCSI Port	79.00	Upgrade for Mac 512KE.
MacProducts USA	Parallel Printer Card	99.00	Parallel-printer card for Mac II. To $199.
Mentauris Corporation	Composite Video Adapter	139.95	Plug-in adapter for Mac 512K to Mac Plus. Connector for high-res. monitors/projectors. For Mac SE, $195.95.
Micro Dynamics, Ltd.	Micro Dynamics Mars	39,000.00	Multiuser archival/retrieval system for mgt. of large numbers of documents. Online access; permanent compact storage. Req. 2MB, 20MB hard disk, AppleTalk.
Micro Systems Consultants	MSC Color Display Card	call	1, 2, 3, or 4 color planes; 8 bits per palette; vertical refresh from 40 to 70 Hz; more. Ext. add-on hardware avail.
MicroGraphic Images	CineMac	95.00	Video interface/video outport for Mac 128K to Mac SE.
MicroGraphic Images	MMVideo Module	99.95	Clip-on video board. Allows different formats, including NTSC for std. videotape.
Microtech Peripherals, Inc.	Memory Expansion Kit	599.00	2MB (two 1MB SIMMs) for Mac Plus to Mac II. 4MB, $1159.
Microtech Peripherals, Inc.	SCSI Port	99.00	SCSI port upgrade.
Network Specialties	Jump 020!	999.00	68020/68881 multispeed accelerator board. 2MB/4MB upgrade kits optional. Req. 512K.
Novix, Inc.	NB4200	595.00	High-speed PC application board. Maximizes 16-bit 8 MIPS NC4016 microprocessor.
NOVY Systems, Inc.	MAC20	595.00	68020 accelerator board. Supports Microsoft FORTRAN/ BASIC. Floating-point coprocessor optional.
NOVY Systems, Inc.	MAC20MX	695.00	68020 accelerator board. CPU speeds to 24 mHz. Floating-point coprocessor/high-speed 1MB or 4MB RAM optional.
OpenMac Enterprises	VA	99.00	Composite video card for Mac 128K to Mac Plus. Mac SE card, $149.95.
perfecTEK Corp.	Mac+PC	995.00	Intel 8086 add-on board that allows Mac to run MS-DOS. Utilities; custom firmware.
Peripheral Land, Inc.	MacPort Plus	189.00	SCSI upgrade for Mac 512KE.
Radius, Inc.	Radius Accelerator	995.00	Quadruples speed of Mac Plus/SE. Compatible w/Radius Full Page Display. Math coprocessor, $395.
Ryad	MacEngine Series	695.00	Accelerator boards w/varied configurations of memory, high-speed CPUs, math coprocessors. To $1995.
Ryad	Video Board/Large Screen	395.00	Video-interface board. Provides access to 12" to 20" monitors. To $1695.
SPECTRA Micro Development	Mac Expansion Chassis	995.00	Allows multiple expansion boards, high-density hard disks. For large-screen display or dedicated file server.

Vendor	Product	Price	Notes
SPECTRA Micro Development	MacAccelerator	995.00	68020 workstation w/68881 coprocessor. Includes C-compiler/assembler. Clips to logic board.
SuperMac Technology	DataPort	149.00	SCSI port for Mac 512KE.
SuperMac Technology	Graphix	495.00	High-res. monochrome controller board for Mac II.
SuperMac Technology	Spectrum 1000/8	1495.00	High-res., 8-bit, color graphics controller for Mac II.
SuperMac Technology	SuperView	495.00	High-res. b/w graphics controller for Mac SE.
Western Automation, Laboratories, Inc.	DASCH	495.00	1MB ext. RAM disk. Daisy-chainable to 16MB. 2MB, $595.
Utilities			
1st Aid Software, Inc.	1st Aid Kit	99.95	Repair-utility kit. Includes manual/recovery software.
ALSoft, Inc.	Disk Ensure	49.95	Hard disk backup program. Req. 512K.
ALSoft, Inc.	Disk Express	39.95	File-recovery/maintenance program. Req. 512K.
ALSoft, Inc.	Pro Link	39.95	Copies text files to/from Apple II. 3 1/2" Pro-DOS disks. Req. 512K, ext. drive.
Bobbing Software	Packer	29.00	Compression/encryption.
Central Point Software	Copy II	39.95	Floppy-to-floppy backup, protected/unprotected w/undelete. Files visible/invisible. MacTools. Req. 512K.
Computer Shoppe	MACPLOTS II	295.00	Driver. Plots PICT files. Plotter sizes A through E. Req. 512K.
Crystal Canyon Computing, Inc.	MacLibrarian-HFS	79.95	Backs up, catalogs, and restores disks, folders, files. 400K disk holds/inventories 4900 files/backups.
DataPak Software, Inc.	Printer Interface II	95.00	Lets Mac print to printers other than ImageWriter. Req. serial printer.
Design Software, Inc.	DS Backup	79.95	Backs up/restores entire disks, selected directories, files, edited files. Prints report of files copied. Req. 512K.
Diversified I/O, Inc.	SoftBackup	69.95	Tape/floppy backup.* Network version, $139.95.
Dove Computer Corp.	RamSnap	59.95	Integrated speed enhancement, RAM disk, disk cache. Includes Switcher.
Fifth Generation Systems	Fastback Mac	99.00	Backs up files to floppy disks at 1MB per min.
FWB Software, Inc.	Hard Disk Partition	54.95	Partitions HFS volume into HFS/MFS subvolumes to password-protect. Req. 512K.
FWB Software, Inc.	Hard Disk Util	89.95	Allows protected software uploading to storage media. Req. 512K.
Ideaform Inc.	DiskQuick	49.95	Catalogs floppy/hard disks; exports to database or word processor.
Ideaform Inc.	MacLabeler	49.95	Creates custom labels for 3 1/2" disks.
MacMemory, Inc.	MaxRAM/MaxPrint	49.95	MaxRAM: full-featured auto-loading RAM-disk program. MaxPrint: DA spooler for ImageWriter.
Macropac International	101 Macros for Excel	69.95	Prewritten macro collection for Excel. Req. 512K.
Mesa Graphics	Plot-It	125.00	Plots PICT documents or graphics copied to Clipboard. Req. 512K, supported plotter, cabling.

Vendor	Product	Price	Notes
Micro Analyst, Inc.	Mac Zap	60.00	Disk/file recovery/utility programs. 70-pp. manual. Bulletin-board support.
Microspot	MacPlot	199.00	Plots from file menu. Use w/MacDraw, MacDraft. Req. 512K, interface cable.
Paragon Courseware	DiskOrder	50.00	File mgt.; cataloging; labeling.
Paragon Courseware	MacQuerty	35.00	Custom Dvorak keyboard reconfiguration.
Personal Computer Peripherals Corp.	HFSBackup	49.95	Archive/restore utility for Mac-compatible hard disks. Req. 512K. Multiuser version for AppleShare, $149.
Searle Software International	FileStar	15.00	Utility for manipulating/searching files.
SoftStyle, Inc.	Plotstart	125.00	Color plotter driver.
Software Power Co.	PowerUp	59.95	Reorganizes data to minimize disk-drive head movement. Volume verify; free-space erase.
Software Products	PowerDisk	59.95	Caches disk data in memory. DA; control panel; "delay writes"; dynamic cache.
Software Products	Software Plot	49.95	Plots from ASCII files. Linear or log format in either axis. Overlay; zoom; online measurements. Custom labels/tokens. Prints/saves as MacPaint file.
Software Supply	PowerStation	59.95	Alternative to Finder for opening applications/documents. Works w/MultiFinder. Req. 512K.
Software Supply	Suitcase	59.95	Allows access to uninstalled fonts/DAs. Req. 512K.
SuperMac Technology	DiskFit	74.95	Hard disk backup software.
SuperMac Technology	Network DiskFit	395.00	Hard disk backup software for LAN.
SuperMac Technology	TapeFit	249.00	Tape backup compatible w/DC-2000 or Apple's 40SC.
SuperMac Technology	Sentinel	149.95	Data security/password protection. 2 levels of file encryption. Req. 512K.
Telos Corp.	VAXDraw	195.00	Utility program. Converts MacDraw/PICT files to IGES files.
THINK Technologies, Inc.	HFS Navigator	59.95	System extension to Open/Save commands of std. applns.
Warp Nine Engineering, Inc.	Fullback	39.95	Hard disk backup utility.
Williams & Macias Microcomputer Products	myDiskLabeler	44.95	Customizes labels. Color, $54.95; laser w/color, $64.95.

Tallgrass, The First Name In Tape Makes Backup Second Nature.



Even people who jump out of airplanes believe in backup. They don't just carry a chute. They carry parachutes!

INTRODUCING THE TG-4040! Designed specifically to meet the expansion needs of the complete Apple Macintosh™ family, by combining 40 Mbytes of tape backup and 40 Mbytes of optional hard disk in a completely integrated solution.

With backup that's every bit as sophisticated as you expect from Tallgrass, a leader in the mass storage marketplace for over 6 years.

Tallgrass has made backing up your Macintosh more practical than ever. And so simple, backing up data becomes second nature.

APPLE ENDORSED IT. TALLGRASS MADE IT BETTER!

Apple endorsed the industry standard QIC 100 tape backup format which, by the way, Tallgrass invented. Now Tallgrass has made it even better.

TWICE AS FAST.

Our tape drive works double-time, backing you up twice as fast as our closest competitors. Including Apple. But the Tallgrass 4040 will slow down, if need be, to read an Apple tape. And we'll guarantee that compatibility.

WITH OR WITHOUT DISK.

Our high performance disk won't slow you down either. Plus, only Tallgrass offers you the ability to add the hard disk at a later date. With or without disk, it's the only solution flexible enough to grow as your business grows.

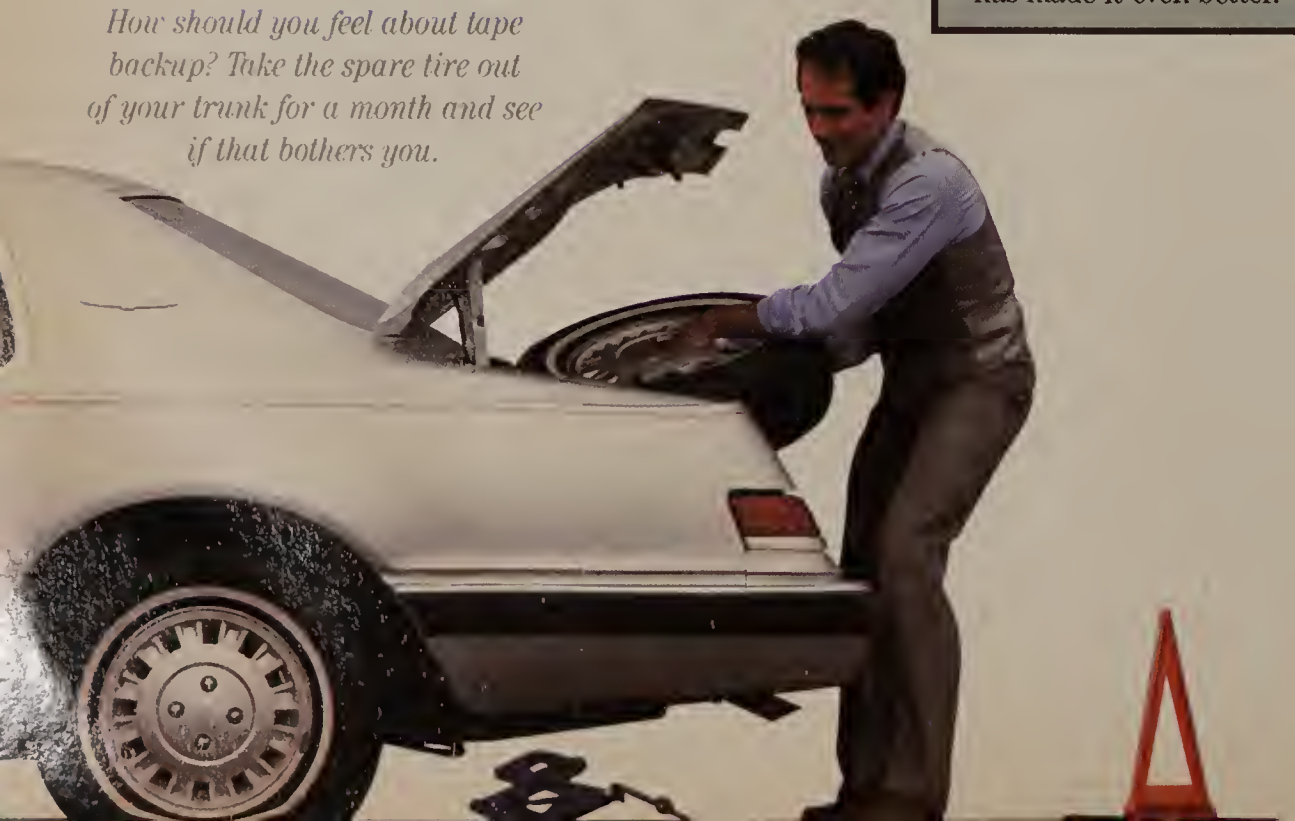
A TRUE 40 MB OF TAPE BACKUP.

Most competitors won't allow you to back up the full capacity of your 40 Mbyte disk. Tallgrass corrects this problem by providing a formatted tape capacity of over 42 Mbytes. A unique tape overflow feature allows you to back up disks of even larger capacities.

WHEN YOU CARE ABOUT YOUR DATA, BACK IT UP.

When the lights come back on, your data may not. That's why Tallgrass took the industry's most reliable medium—magnetic tape—and perfected a format that's becoming an Apple standard.

How should you feel about tape backup? Take the spare tire out of your trunk for a month and see if that bothers you.



Breakthrough: We store 40 Mbytes of backup on this tiny tape cartridge, with legendary Tallgrass simplicity and reliability.

You think they filmed 22 years of Lassie with just one dog? Never. There were always at least two backup Lassies in the wings.

Nobody ever broke their No. 2 pencil during a test. Unless they had just one.

The TG-4040 is available in Apple platinum or beige.

This Apple "sider" fits neatly beside your Apple for easy tape access. An ideal companion for your Mac Plus, Mac SE and Mac II.

THE SIMPLER, THE BETTER.

Tallgrass provides the solution with software that's smart enough to keep things simple. Yet with the features all systems should have, but don't.

- User-friendly icon-interface software.
- Mirror image, file-by-file and volume backup modes.
- Automatic, unattended backup operations. Set it once and forget it.
- Incremental or modified file option backs up only files that have been changed since the previous backup.
- SCSI interface for compatibility with all internal and external hard disks for the Macintosh.
- Apple Tape Backup 40 SC,™ Apple Share™ and A/UX™ compatible.

TALLGRASS BACKS *YOU* UP WITH SERVICE AND SUPPORT.

Tallgrass has been backing its products since 1981, a statement that very few of our competitors can make. Our reputation for service and support is second to none. And you can be sure we'll be here to back you up as you move forward.

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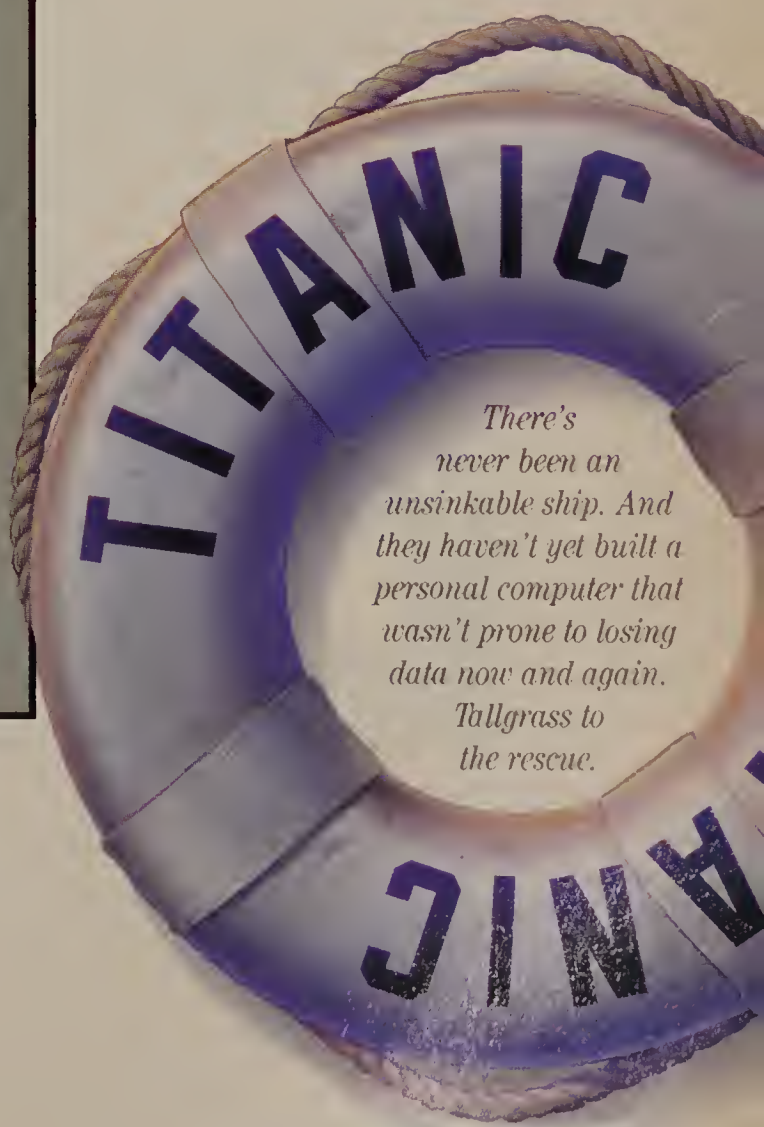
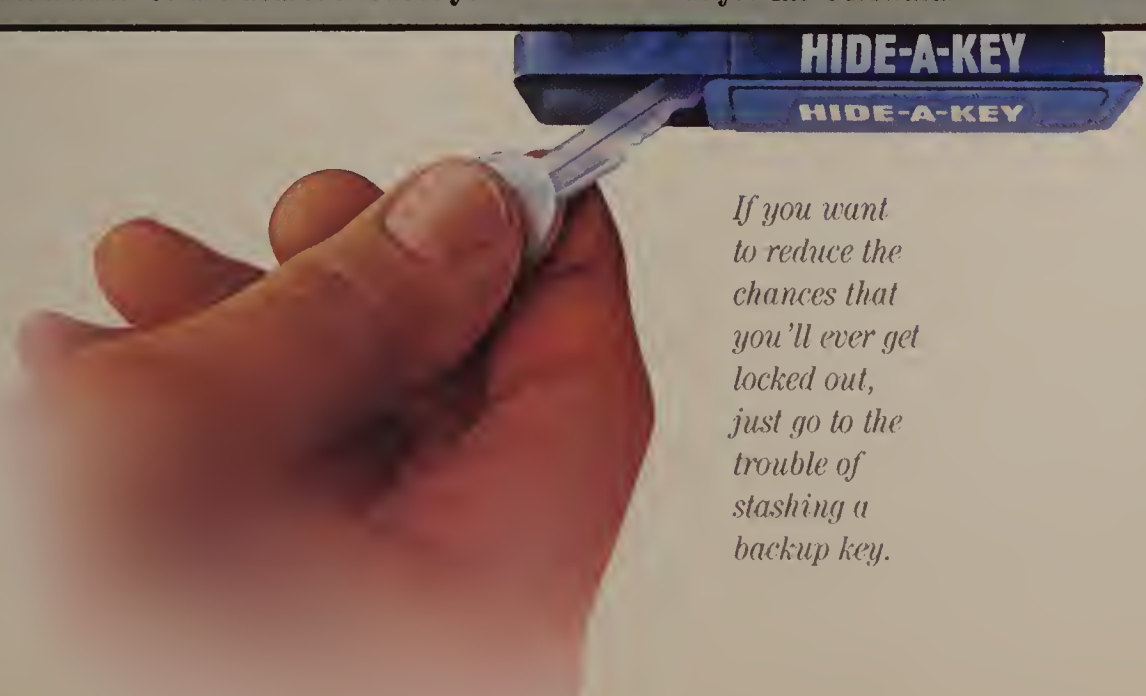
CALL 1-800-228-3475

For information or the dealer nearest you.



There's never been an unsinkable ship. And they haven't yet built a personal computer that wasn't prone to losing data now and again. Tallgrass to the rescue.

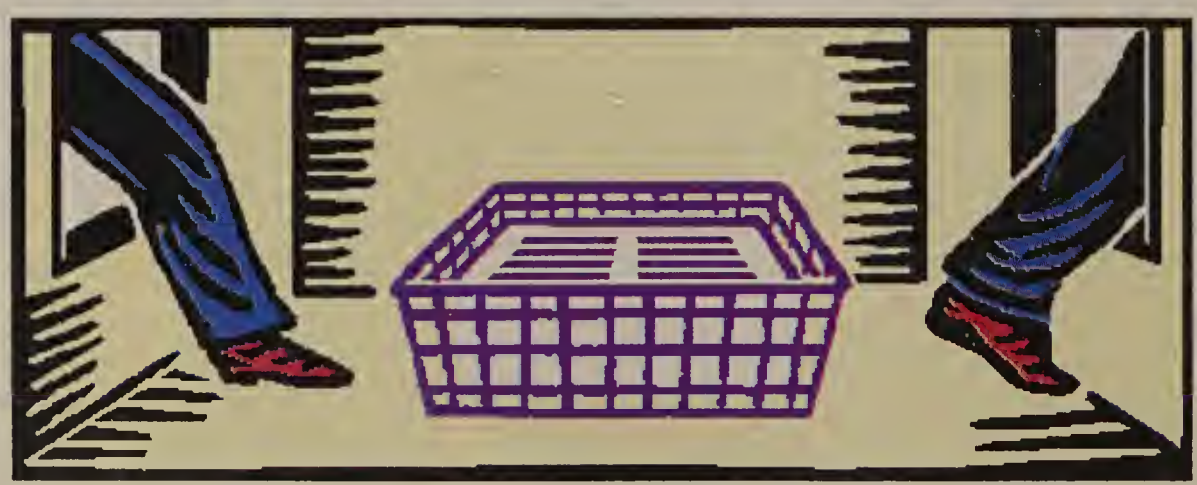


If you want to reduce the chances that you'll ever get locked out, just go to the trouble of stashing a backup key.

Circle 6 on reader service card

Macintosh, Apple Tape Backup 40 SC, Apple Share and A/UX are trademarks of Apple Computer, Inc.

Input and Output



Until recently, the Macintosh came with a mouse, a keyboard, and a monitor, all of which limited the need for, and means of, customizing the system. Now SE and Mac II owners must buy a keyboard separately, and a monitor for the II is also an extra. The Apple Desktop introduced with the Mac II and the SE lets you daisy-chain up to 16 devices to the II or SE, but choosing input and output devices requires some thought. Alternative input devices take the place of the Mac's mouse or keyboard, and output devices transform the Mac's graphics and text into printed pages or monitor displays. In contrast to what was available during the early days of the Mac, many useful substitutes for its stock components are now on the market.

Making a Choice

The usefulness of input and output devices depends on the work you do and the software you run. Many alternate devices are rather expensive, so decide carefully whether their advantages are worth the cost. If the product you get isn't compatible with the connectors on your Mac, you'll need an adapter.

Mouse and Keyboard Replacements

Since it can pick up dust and dirt from the tabletop, the Mac's electromechanical mouse requires routine maintenance. An optical mouse, like the A+ Mouse from Mouse Systems, is not as susceptible to dirt, but it can be tricky to manipulate. If you aren't comfortable with the standard mouse's operation, others, such as Kensington's Turbo Mouse, move the pointer differently.

Apple offers two versions of its keyboard for the Mac SE and the II: a standard model (similar to one on the Apple IIGS) and an enhanced model with extra keys to support IBM PC emulation. DataDesk's Mac-101 keyboard, modeled after Apple's enhanced board, includes 12 function keys, separate cursor control keys, and a full numeric keypad. None of these boards works with the Plus or 512K Enhanced, so about the only enhancement for an older Mac is to add Apple's numeric keypad, which fits alongside the regular keyboard.

As mouse alternatives, joysticks and trackballs are ideal for playing games, and graphics tablets replace the mouse for artwork (see "Graphics").

Scanners

Scanners bypass the mouse and keyboard to input text and/or graphics at rapid speeds. Though their features and prices vary widely, they all optically scan the surface of a piece of paper (up to about 8½ by 14 inches in size) and convert the image into data for processing by the Mac.

A unique graphics scanner for the Mac is Thunderware's ThunderScan, which uses the ImageWriter for the actual scanning by replacing the printer's ribbon. Though ThunderScan is inexpensive and can reproduce images as well as a desktop scanner, scanning a full 8- by 10-inch picture may take 20 minutes.

Other scanners come in two basic types: flatbed and sheet-fed, both of which output the same high-resolution graphics. Sheet-fed models are more common and generally less expensive, but must be used with individual, cut originals.

Designed expressly for desktop publishing, scanners have an upward resolution of 300 dots per inch, the same as the LaserWriter. To accommodate full-page graphics, your Mac should be equipped with at least one megabyte of memory. Most pages take only 15 to 30 seconds to scan, although you must rescan after adjusting controls to refine the image.

Video Digitizers and Bar Code Readers

Video digitizers take a snapshot of still or real-life images, then turn the picture into digital data for the Mac. You use a video recorder to take the picture, and a digitizer, like Koala's MacVision or Magic from New Image, to convert the image into binary form.

The typical bar code reader, such as the PC-380 from TPS Electronics, connects to the Mac between the computer and the keyboard. Waving the reader over the code picks up the data and enters it into the Mac, for use in applications like word processing and spreadsheets. You can also print your own bar codes using the ImageWriter or LaserWriter. Others, like the Videx Time Wand and the Cauzin Softstrip Reader, handle bar code data in unique ways.

Dot Matrix and Daisy Wheel Printing

The ImageWriter is the only printer you can use to print graphics and text created by all Mac software, but a few dot matrix models, such as the NEC Pinwriter, Okidata Microline 192/193, and Toshiba P-1340, can print text as well as graphics from selected applications. NEC's color printers can be used (with NEC software) to make color printouts with the Mac. Both Apple's BusinessWriter and the Toshiba P-1340 have a 24-pin printhead, in contrast to the ImageWriter's 9 pins, and produce high-quality text in one pass.

You can use daisy wheel printers with the Mac as long as they have the proper serial interface. A daisy wheel printer driver (included with some applications such as *Microsoft Word* 3.0) adjusts the Mac's special text format for proper printing. Of course, daisy wheels can offer neither graphics capability nor variable type styles.

Laser Printing

The Apple LaserWriter is the premier laser printer for the Macintosh, but you can use just about any other model. Laser printers can be loosely separated into two groups: those, like the LaserWriter, that use PostScript, and those that don't. Without PostScript, many of the unique laser printer effects from programs like *MacDraw, PageMaker,* and *Word* cannot be reproduced. A PostScript-compatible printer like the Texas Instruments Omni 2115 is also able to output fancy text and graphics.

Non-PostScript laser printers, such as the Hewlett-Packard LaserJets, are used primarily as substitute daisy wheels. Their print quality is high, and they output much faster than conventional daisy wheels.

Plotters

Charts, graphs, and technical drawings can be reproduced on the Mac with a color plotter, which connects like a printer and uses a driver program run separately or accessed through a desk accessory. Plotters that operate well with the Macintosh include the Hewlett-Packard HP 7470 and 7475, the Toshiba P-351, and the Apple Plotter 410. All have multiple pens for full-color plots. While almost any plotter can connect to the Mac, a separate driver, such as *MacPlot, MacPlots II, Plotstart,* or *Plot-It,* is required. Some software packages, including *Cricket Graph* and *EZ-Draft,* have built-in plotter interfaces.

Keyboards, mice, plotters, and other devices that let you put in the raw materials of information and print out finished documents

Film Recorders and Monitors

Film recorders, like those from Presentation Technologies, Matrix, and Dunn Instruments, capture the image of the Mac's screen on 35mm film, which is transferred to color slide film for presentations. Expansion monitors relieve the eyestrain of staring at the Mac's 9-inch monochrome screen all day. Many add-on monitors let you display an entire 8½- by 11-inch page at once, a feature that is useful for desktop publishing. See "Systems and Memory" for more information.

Coming Attractions

Many of the Mac's existing input/output products, especially image scanners, are being refined. Expansion monitors and graphics boards will give rise to high-resolution light pens and touch screens, two technologies familiar in the IBM PC world. Largely in response to the desktop publishing boom, programmers and manufacturers have started to tailor their wares to specific applications. Marked improvements in software and hardware design should come soon. Make sure you get the latest version of any product when you buy an alternate device (call the manufacturer before purchasing).

While today's crop of alternate input/output devices for the Macintosh may seem diverse, it's only a sample of what is likely to come in the next year or two. The new open architecture of the Mac SE and the Mac II, and their extensive color capabilities, will greatly increase the buyer's options. The Mac has grown up quickly.

—Gordon McComb

Vendor	Product	Price	Notes
Bar Code Readers			
DATALOGIC OPTIC ELECTRONICS, INC.	DATAPEN	475.00	Allows use of bar code reader w/o unplugging keyboard.
TPS Electronics	PC-380 Bar Code Reader	795.00	Bar code reader. Connects bet. keyboard/computer. PC-385 for Mac SE/II.
TPS Electronics	PC-580/PC-585 Magnetic Stripe Encoder/Verifier	695.00	Magnetic stripe reader. Connects bet. keyboard/computer. PC-585 for Mac SE/II.
TPS Electronics	PC-3800 Bar Code/Magnetic Stripe Reader	995.00	Combination bar code/magnetic stripe reader. PC-3850 for Mac SE/II.
TPS Electronics	PC-5800 Magnetic Stripe Encoder/Verifier	795.00	Encodes magnetic stripes.
Videx, Inc.	Bar Code Labeler	89.00	Bar-code generating program. Prints code 3 Of 9. Req. 512K, ImageWriter- or LaserWriter-type printer.
Videx, Inc.	Time Wand	836.00	Hardware/software. Portable bar code reader. Includes database.
Cameras			
Dunn Instruments	Dunn Color Macintosh System	6000.00	Film recorder interfaces to Mac. Professional/instant color transparencies, prints. 35mm. to 8" x 10". Req. 512K, ext. drive. $6000 up.
Matrix Instruments inc.	SlideWriter	11,795.00	Film recorder for professional 35mm slide production. Includes SCSI interface, built-in camera, utility software, cables.
Digitizers			
Anatex, Inc.	Personal Writer	795.00	Handwriting recognition. Req. 1MB, hard disk. $795 up.
GTCO Corp.	Macintizer	399.00	Integrated digitizer. Enhances graphic capabilities.
Impulse	Impulse Audio Digitizer	199.95	Analog to digital sampling. 8-bit resolution sampling from 22 kHz to 5 kHz. Places sound in software.
Koala Technologies	MacVision	349.95	Converts camera/VCR images to digital data. Onscreen image can be manipulated with graphics/paint programs. Req. video camera or VCR.
Kurta Corp.	Graphics Tablet	295.00	Input systems from 6" x 9" to 42" x 60". Macro capability. Corded or cordless pins, cursors. Req. 512K. $295 up.
Micron Technology, Inc.	MicronEye	295.00	Digital-imaging system. Camera/software for capturing/ displaying images.
New Image Technology, Inc.	Magic	399.00	Video-input digitizer for Mac 128K to Mac SE. B/w camera, $150.00. LaserWriter 300-dpi software, $49.95.
Peripheral Systems, Inc.	Summagraphic	445.00	Graphics digitizer. 6" x 9". 12" x 12" avail., $599.
Pixielogic, Inc.	MacViz	595.00	Real-time video digitizer for inputting images from NTSC-std. signal. MacPaint-like file. Output quality: 1 bit.
Pixielogic, Inc.	ProViz	1595.00	Real-time video digitizer for inputting images from NTSC-std. signal. Professional-output quality: 4 bit. EPSF. Req. 512K, SCSI interface.

Vendor	Product	Price	Notes
Softweaver	PenMac	345.00	6" x 9" nonmagnetizing pen/tablet digitizer. Auto-translation; rotation; reduction; enlargements; more. Sizes to 42" x 60"; prices to $6695.
ThunderWare, Inc.	ThunderScan	249.00	Digitizer. Scans w/ImageWriter. Req. 512K.
Keyboards			
Apple Computer, Inc.	Apple Expanded Keyboard	229.00	Alternate Mac SE/II keyboard. 15 function keys; numeric keypad; cursor keys.
Apple Computer, Inc.	Apple Keyboard	129.00	Std. Mac SE/II keyboard. Numeric keypad; cursor keys.
Apple Computer, Inc.	Macintosh Plus Keyboard	129.00	78 keys w/2-key rollover software. Numeric keypad; cursor keys.
Cambridge Automation	Numeric Keypad	59.00	Numeric keypad. Installs to Mac keyboard.
Cambridge Automation	Numeric Turbo	169.00	Combines Trackball w/Numeric Keypad. Gives Mac 128K/512K keyboards the capabilities of a Mac Plus keyboard.
datadesk International, Inc.	MAC-101/101ADB	169.95	Mac-compatible keyboards w/15 function keys across top. Macro software.
Tangent Technologies, Ltd.	PC MacKey	120.00	AT-style keyboard for Mac 128K to Mac Plus.
Mice and Alternatives			
Honeywell/Disk Instruments	quadLYNX trackball	129.00	Replacement for std. Apple mouse.
Kensington Microware	Turbo Mouse/Turbo Mouse ADB	129.95	Alternative mouse w/ball on top.
Kraft Systems Co.	QuickStick	59.95	Replacement mouse. Switch selects bet. mouse/joystick. 3 buttons; adjustable trims. Self-center or free-float.
MicroTouch Systems, Inc.	Mac & Touch Screen	795.00	Mouse-compatible driver software. Touch-screen control; simulates mouse actions.
Mouse Systems Technologies	A+Mouse/ADB A+Mouse	119.00	Optics/electronics w/reflective pad. 200 counts per in.; pixel-point accuracy. A+Mouse for Mac 128K to Mac Plus; ADB A+Mouse for Mac SE/II.
Personics	HeadMaster	995.00	Allows physically disabled to operate Mac equipment using only head movement. Not ADB-compatible. Req. 512K.
Plotters			
Hewlett-Packard	HP 7475A	1895.00	6-pen plotter. Produces reports/presentation graphics for PC-CAD. Business/technical applns.
Hewlett-Packard	HP 7550A	3900.00	8-pen plotter. Auto. sheet feeding; unattended plotting. Single or shared environment.
Hewlett-Packard	HP ColorPro	1295.00	810 plotter. Creates text, charts, graphics for presentations/reports.
Hewlett-Packard	HP DraftPro	5400.00	8-pen drafting plotter for personal CAD systems.
Versatec	Versacolor	8995.00	Color thermal plotting. Price varies w/configuration.
Printers			
Apollo Computer	Domain/Laser-26	25,000.00	300 dpi; 26 pp. per min.; 13 built-in fonts. PostScript-compatible. Parallel printer, $27,000.

Vendor	Product	Price	Notes
Apple Computer Corp.	ImageWriter LQ	1399.00	216 dpi; 27-pin printhead; 250 cps draft, 90 cps NLQ; 15"carriage; 4 built-in fonts.
Apple Computer, Inc.	ImageWriter II	595.00	Graphics in b/w, color. Up to 2.5 pp. per min.
Apple Computer, Inc.	LaserWriter/LaserWriter Plus	4999.00	Near-typeset quality. Built-in font selection; PostScript-compatible. LaserWriter Plus, $5799.
AST Research	TurboLaser/PS	3995.00	300 dpi; 8 pp. per min.; 35 built-in fonts. PostScript-compatible.
Compugraphic Corp.	CG 400-PS	29995.00	406 dpi; 18 pp. per min.; 73 built-in fonts; 20MB hard disk. PostScript-compatible.
Computer Friends	Panchroma A	4500.00	8 1/2" x 11" color thermal printer. 200 dpi; paper or transparencies. 14" x 17", $9000.
Dataproducts Corp.	LZR 2665	17900.00	300 dpi; 26 pp. per min.; 13 built-in fonts. PostScript-compatible.
Diconix, Inc.	Dijit 1/PS	17995.00	300 dpi; 20 pp. per min.; 17 built-in fonts. PostScript-compatible.
Digital Equipment Corp.	PrintServer 40	57900.00	300 dpi; 40 pp. per min.; 29 built-in fonts. PostScript-compatible.
Digital Equipment Corp.	ScriptPrinter	6295.00	300 dpi; 8 pp. per min.; 29 built-in fonts. PostScript-compatible.
General Computer Corp.	Personal LaserPrinter	2599.00	300 dpi; 22 built-in fonts; Req. SCSI connecter/cables.
Hewlett-Packard	PaintJet	1395.00	Color graphics/NLQ printer.
Hewlett-Packard	HP LaserJet Series II	2495.00	8 pp. per min. 300-dpi graphics; resident soft fonts; font cartridges. To $4490.
Hewlett-Packard	HP PaintJet	1395.00	Color graphics printer w/NLQ text.
Linotype Co.	Linotronic 100	31,950.00	PostScript-compatible laser typesetter. Res. to 1270 scan lines. Outputs to paper, film, and onyx plates.
Linotype Co.	Linotronic 300	59,950.00	PostScript-compatible laser typesetter. Res. to 2540 scan lines. Outputs to paper, photopaper, film, and onyx plates.
NEC Information Systems	NEC Pinwriters	490.00	Line includes P2200, P6, P7, P5XL, P9XL. Dot matrix, 24-wire, full-function printers. To $1699.
NEC Information Systems	NEC Silentwriter	2295.00	Line includes 850, 860+, 890. Page printers from text-only output to PostScript output using LED array. To $4795.
NEC Information Systems	NEC Spinwriter	545.00	Line includes 350, 360, 3500, 8800. Fully formed LQ printers. To $1395.
Okidata	Microline 192+	499.00	Dot matrix printer. 200 cps; 40 cps NLQ. Menu-select mode. Wide-carriage ML193+, $799.
QMS Inc.	QMS PS 800+	5494.00	300 dpi; 8 pp. per min.; 35 built-in fonts. PostScript-compatible. 1MB ROM, 2MB RAM.
QMS Inc.	QMS PS 800 II	6495.00	300 dpi; 8 pp. per min.; 35 built-in fonts. PostScript-compatible. 1MB ROM, 3MB RAM.
Qume Corp.	ScripTEN	4795.00	2MB laser printer. Collated output; 10 pp. per min.; 300 dpi. Serial/parallel ports. 4MB model, $5295.

Vendor	Product	Price	Notes
Seiko Instruments USA, Inc.	CH5301	6995.00	8 1/2" x 11" color thermal printer. Paper or transparencies; 4912 colors; 152 dpi. Req. video-signal adapter.
Seiko Instruments USA, Inc.	CH5312	12,495.00	8 1/2" x 11" or 11" x 17" color thermal printer. Paper or transparencies; 4912 colors; 203 dpi. Req. video-signal adapter.
Texas Instruments	OmniLaser 2108	5995.00	Workstation laser page printer using PostScript.
Texas Instruments	OmniLaser 2115	7995.00	Workstation laser page printer. Combines PostScript use w/shared resource capability.
The Laser Connection	PS Jet Printer	4995.00	Fully compatible PostScript laser printer. Req. 512K.
The Laser Connection	PS Jet Printer Plus	5495.00	Fully compatible PostScript laser printer w/35 fonts. Req. 512K.
The Laser Connection	PS Jet Printer Upgrade	2995.00	Upgrades Canon CX-based printer to full PostScript compatibility. Req. 512K.
The Laser Connection	PS Jet Printer Upgrade Plus	3495.00	Upgrades Canon CX-based printer to full PostScript compatibility. 35 fonts. Req. 512K.
Toshiba America, Inc.	P351	1399.00	300/100-cps, 24" x 42" dot matrix printer.
TPS Electronics	Barcode Printing Software	200.00	Prints Code 39 on ImageWriter/LaserWriter. Req. 512K
Varityper	VT-600	18,500.00	600 dpi; 10 pp. per min.; 13 built-in fonts; 20MB hard disk. PostScript-compatible.
Scanners			
Abaton Technology Corp.	SCAN 300	2495.00	Digitizes drawings, graphics, photos at 300 dpi. 32 levels of gray. Changes continuous tones to halftones. Documents to 8 1/2" x 14".
Abaton Technology Corp.	SCAN 300/FB	2295.00	Flatbed scanner. Digitizes drawings, graphics, photos at 300 dpi. Changes continuous tones to halftones. C-Scan graphic-interface software avail.
Abaton Technology Corp.	SCAN 300/SF	1895.00	Roller-fed optical scanner. Digitizes artwork/photos at 300 dpi. Changes continuous tones to halftones. C-Scan software avail.
AST Research	TurboScan	1895.00	300-dpi graphic-imaging scanner w/SuperScan graphic editor. Req. 512K.
Datacopy	JetReader	1300.00	Sheet-fed scanner. Req. MacImage Kit, $695.
Datacopy	730 Flat Bed Scanner	1800.00	Scans bound documents. Precise positioning of originals for accuracy. Scans from 1" x 1" to 8 1/2" x 11". Req. MacImage Kit, $695.
DEST Corp.	PC Scan	2685.00	Direct graphics input. Req. Publish Pac for the Mac, Macintosh Interface.
DEST Corp.	PC Scan Plus	3185.00	Direct photo or graphics input. 32 levels of halftones. Req. Publish Pac for the Mac, Macintosh Interface.
Hewlett-Packard	HP ScanJet	1495.00	Flatbed design. Auto. document feeder. Req. 512K, HP SCSI Interface, $595.
LoDOWN	Image Scanner	1785.00	300-dpi scanner w/controller board/cables. Req. OCR software, $300.

Vendor	Product	Price	Notes
LoDOWN	Image Scanner Flatbed	1795.00	300-dpi flatbed scanner w/controller board/cables. Req. OCR software, $300.
Microtek Labs,, Inc.	MS-300A	2495.00	Intelligent, 300-dpi image scanner for photos or line drawings. Includes 300-dpi paint program. Req. 512K.
Microtek Labs, Inc.	MS-300C	1695.00	Intelligent, 300-dpi image scanner for photos or drawings. Includes 300-dpi paint program. Req. 512K. OCR software optional, $595.
Microtek Labs, Inc.	MSF-300C	1895.00	Intelligent, 300-dpi, flatbed image scanner for photos or line drawings. Includes 300-dpi paint program. Req. 512K.
Microtek Labs, Inc.	MacRead	600.00	Reads up to 100 typefaces, 6 to 14 pt. Reads Laser, dot matrix, typewritten copy. Req. 512K.
New Image Technology, Inc.	MacScan	1547.00	High-res. page scanner for Mac II.
Spectrum Digital Systems, Inc.	LS-300 Scanner	1550.00	Scans 8 1/2" x 11" sheet in less than 15 seconds. 300-dpi. For line art/halftone images. Req. 1MB.
Spectrum Digital Systems, Inc.	TrueForm System	1995.00	Scanner/software system for filling out forms. Transmits form image to screen. Prints form w/data or data alone. Req. 512K.
The Laser Connection	IS 300	895.00	Add to PC laser printer. 300 dpi.
The Laser Connection	IS 300 Scanner	895.00	Scans text/graphics; 300 dpi. Interface, $695.

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Affinity Microsystems, Inc., *1050 Walnut St. #425, Boulder, CO 80302, 303/442-4840*
AG Plus Software, *410½ Second St., Ida Grove, IA 51445, 712/364-2885*
Aldus Corp., *411 First Ave. S #200, Seattle, WA 98104, 206/622-5500*
Alisa System, *221 E. Walnut St. #230, Pasadena, CA 91101, 818/792-9474*
Allotype Typographics, *1600 Packard Rd. #5, Ann Arbor, MI 48104, 313/663-1989*
ALSoft, Inc., *P.O. Box 927, Spring, TX 77383, 713/353-4090*
Altsys Corp., *720 Ave. F #108, Plano, TX 75074, 214/424-4888*
American Intelliware Corp., *P.O. Box 6980, Torrance, CA 90504, 213/533-4040, 800 222-SOFT*
AnaMatrix, Inc., *1219 W. Gentile St., Layton, UT 84041, 801/546-1616*
Anatex, Inc., *1801 Ave. of Stars #507, Los Angeles, CA 90067, 800/322-4744, 213/556-1628 in California*
Anchor Automation, Inc., *20675 Bahama St., Chatsworth, CA 91311, 818/998-6100*
Ann Arbor Softworks, Inc., *2393 Teller Rd. #106, Newbury Park, CA 91320, 805/375-1467*
Apollo Computer, *330 Billerica Rd., Chelmsford, MA 01824, 617/256-6600*
Apple Computer, Inc., *20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010*
Ashton-Tate Corp., *20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000, 800/437-4329*
AST Research, *2121 Alton Ave., Irvine, CA 92714, 714/553-0340*
Automatix, Inc., *1000 Technology Park Dr., Billerica, MA 01821, 617/667-7900*
Avatar Technologies, Inc., *99 South St., Hopkinton, MA 01748, 617/435-6872*

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B. Knick Drafting, *313 Marlin Pl., Melbourne Beach, FL 32951, 305/727-8071*
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Baudville, *1001 Medical Park Dr. SE, Grand Rapids, MI 49506, 616/957-3036*
Beck-Tech, *P.O. Box 5027, Berkeley, CA 94705, 415/548-4055, 800/227-2400*
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Bering Industries, Inc., *280 Technology Circle, Scotts Valley, CA 95066, 408/438-8779, 800/BERING1, 800/533-DISK in California*
Berkeley System Design, Inc., *1708 Shattuck Ave., Berkeley, CA 94709, 415/540-5536*
BioPac Systems, *42 Aero Camino #215, Goleta, CA 93117, 805/968-8880*
Bishop Graphics CAD Systems Corp., *5388 Sterling Center Dr., Westlake Village, CA 91359, 818/991-2600*
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Blue Whale Technologies, *6900 Mentone, Coral Gables, FL 33146, 305/665-4665, 800/628-2828*
Blyth Software, Inc., *2929 Campus Dr. #425, San Mateo, CA 94403, 415/571-0222*
Bobbing Software, *67 Country Oaks Dr., Buda, TX 78610, 512/295-5045*
Borland International Ltd., *4585 Scotts Valley Dr., Scotts Valley, CA 95066, 408/438-8400*
Boston Publishing Systems, Inc., *1260 Boylston St., Boston, MA 02215, 800/637-5010*
BrainPower, Inc., *24009 Ventura Blvd. #250, Calabasas, CA 91302, 800/345-0519, 818/884-6911 in California*
Bravo Technologies, Inc., *P.O. Box 10078, Berkeley, CA 94709-0078, 415/841-8552, 800/345-2888*
Breakthrough Productions, *10659 Caminito Cascara, San Diego, CA 92108, 619/281-6174*
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Cambridge Automation, *20200 State Rd., Cerritos, CA 90701, 800/345-8666, 800/826-9214 in California*
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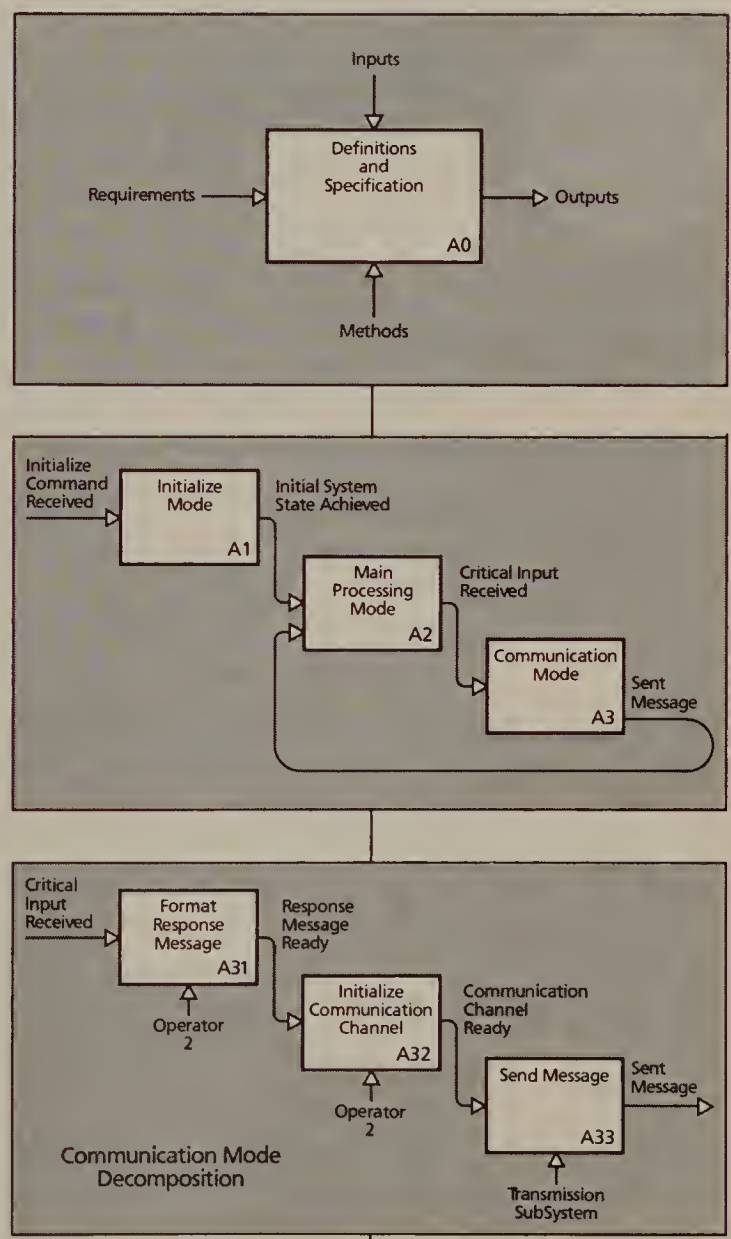

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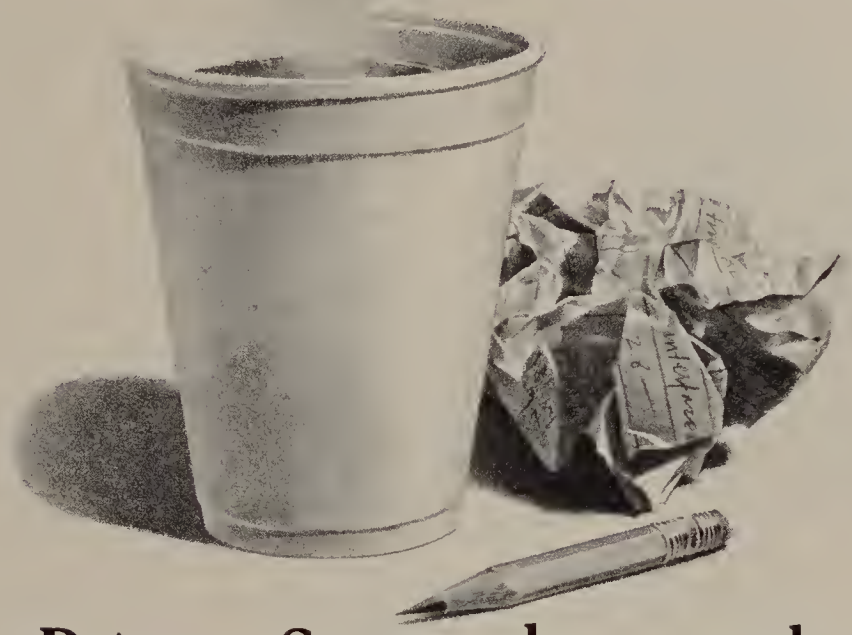

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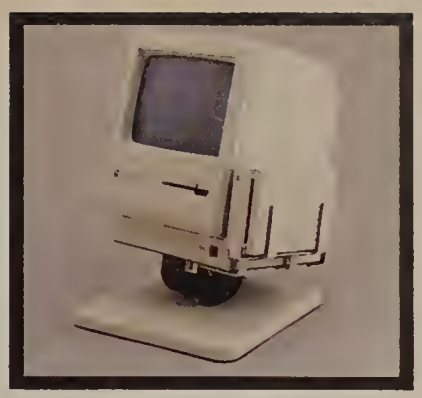

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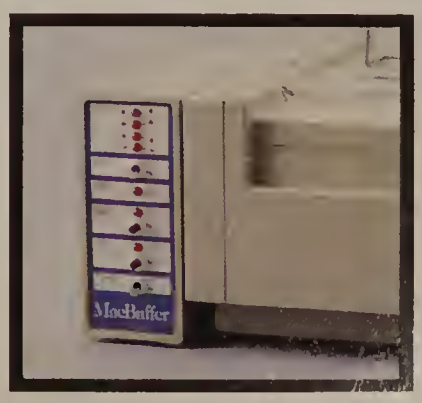

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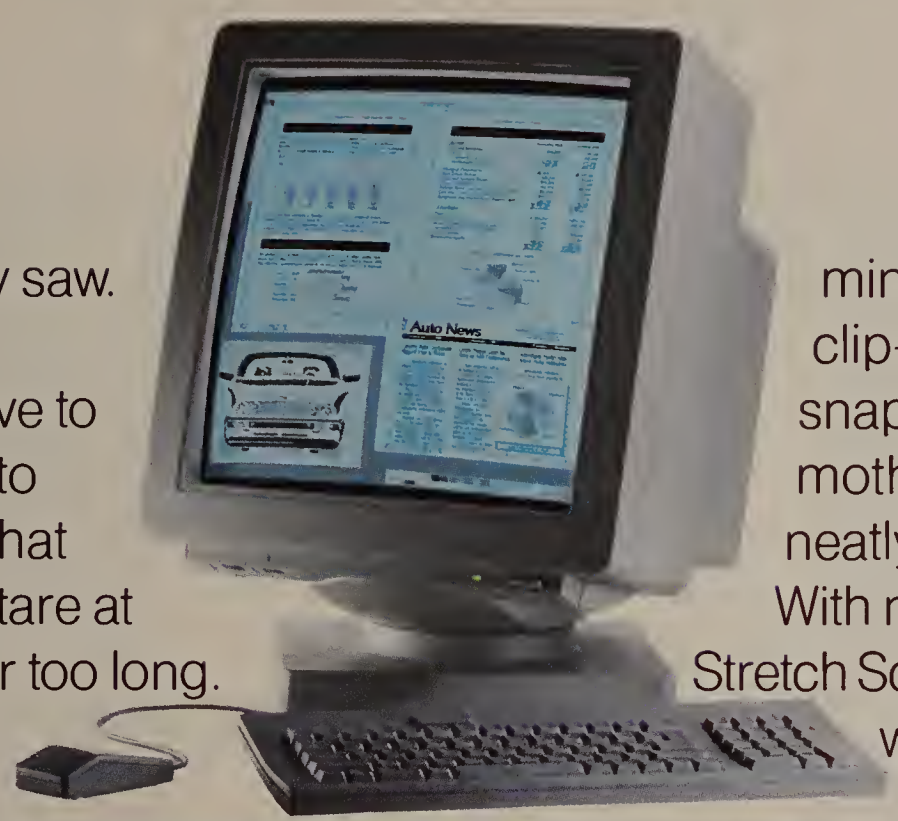

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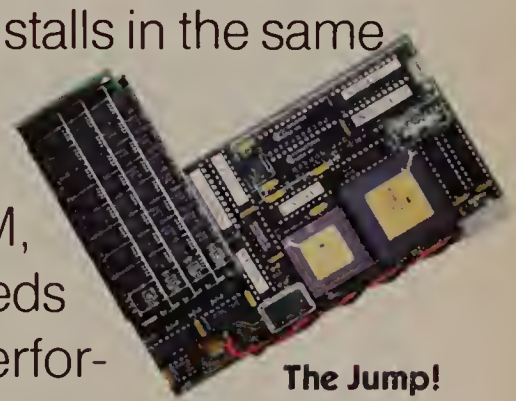

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New Products

Information on the Mac's latest software, hardware, and accessories

Edited by Eileen Drapiza

This section covers Macintosh products formally announced but not yet evaluated by *Macworld*. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

AEC Information Manager Database that enables design and construction managers to automate, schedule, organize, and track the many aspects of a project. 1MB min. memory. $595. AEC Management Systems, Inc., 301/428-3694.

Arithmetic, Algebra I, and MacFunction Course supplements or programs for self-study and review of mathematical concepts. 512K min. memory. $49.95. True Basic, 603/643-3882.

Client Portrait *Double Helix* template for client management in law offices. 512K min. memory. $59.50. GreenLight, 312/782-6496.

Click & Clip Clip art software quarterly. Includes business, seasonal, and sports borders, and newsletter head artwork. Single issue $39.95; one-year subscription $124.50. Studio Advertising Art, 702/641-7041.

Command Typographer Typography package with user-definable kerning; automatic hyphenation and justification; and online help. Outputs to PostScript devices. 1MB min. memory. $495. Laser Text Publishing Systems, 212/925-4551.

DA-Switcher Utility that enables use of multiple sets of desk accessories and grouping of individual sets with specified applications. 512KE min. memory. $49.95. Olduvai Software, 305/665-4665.

DrawStructures Chemical structure library requiring a drawing program that reads PICT files. Not compatible with *Cricket Draw*. $79.95; educational discount available. Modern Graphics, 317/253-4316.

Dr. B. Careful Teaches students (grades 6 to 11) about AIDS. Divided into definition, transmission, prevention, treatment, question, exercise, and game sections. 512K min. memory. $70 Canadian. CourseMaker International Inc., 416/738-8722.

EmDash Fonts Downloadable laser fonts, including ArchiText, UpStart, and Basic. Price depends on font and style. EmDash, 312/441-6699.

Fast Forms Construction Kit Form design program. Includes gray shades, hairlines, foreground and background drawing planes for visible and invisible objects, text editing, interactive fields, some unique object alignment, distribution and copy/paste techniques, and the option to fill out the forms on screen. 512K min. memory. $89. New Directions Software, 403/250-1969.

FlowMaster Flowcharting system for professional advertising media. Cost analysis capability. View information as a flowchart, bar chart, or as a cost/rating summary report. 512K min. memory. $495. Select Micro Systems, Inc., 914/245-4670.

Grant Manager and Personnel Manager Grant Manager is for grant and fund accounting; Personnel Manager is a companion program. 512K min. memory. $495 each. Niles & Associates, 415/655-6666.

GraphPainter For creating presentation-quality graphs. Includes eight drawing tools and seven curve fits. 512K min. memory. $50. Greg Brasel, 314/256-3317.

HB Music Engraver Music notation software. Automatically positions all musical characters and text with a user-modifiable rule base. 1MB min. memory. $350, publisher's version $5000. H.B. Imaging, Inc., 801/225-7222.

Icon-It Customize floating icon bars for frequently used menu items, desk accessories, F-keys, and macros. 512KE min. memory. $79.95. Olduvai Software, 305/665-4665.

MacNail *Microsoft Excel* template collection for construction cost estimation, with cost-control worksheet and macros. $145. Turtle Creek Software, 607/589-6858.

Mac 'N Med Medical office management system. Registers patients, tracks insurance and financial information, prints insurance forms, generates patient financial statements and deposit slips. 512K min. memory. $399.95, multiuser $599.95, demo disk $10. Somerville MD Associates, 302/678-2131.

MasterWorks Three courses covering *Microsoft Works* database, spreadsheet, and form-letter function. 512K min. memory. $49.95 each. Personal Training Systems, 408/559-8635.

Maze Survival Strategy game in which the goal is to keep a colony of bugs alive inside a changing maze. 128K min. memory. $39.95. Olduvai Software, 305/665-4665.

(continues)

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PIXymbols One PostScript-based pictorial symbol fonts. $70. Page Studio Graphics, 602/839-2763.

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Power Tools Software engineering tool set designed to support software from concept through code to maintenance. 512K min. memory. $3295. Iconix Software, 213/458-0092.

Professional Layout Templates Collection I Forty templates for *PageMaker* 2.0. 512K min. memory. $69.95. Performance Software, 919/395-0233.

Professor Craps Casino craps simulation teaches how to bet and lay odds, understand the table and percentages, and develop personal strategy. 512K min. memory. $49.95. Scorpio Systems International, 415/398-5155.

Prosper Sales and client management program tracks and schedules activities. Includes a partly user-definable relational database. Provides computer-assisted phone calling. 512K min. memory. $495 including 1200-baud modem. Twenty-first Century Software, 504/888-3600.

Read-It! and Read-It! TS Both provide optical character recognition for 300-dpi scanners. *Read-It! TS* is for ThunderScan. 512K min. memory; requires 300-dpi scanner. $295 each. Olduvai Software, 305/665-4665.

Reggie Converts *MacDraw, MacPaint,* and clipboard images to DEC's ReGIS or SIXEL formats for importing Mac graphics into DEC host-based applications. 512K min. memory. $99. White Pine Software, 603/886-9050.

RMS Plus Restaurant management system with Inventory Control and MenuManagement base modules. 512KE min. memory; requires *Omnis 3 Plus.* $995; Accounts Payable, Accounts Receivable, General Ledger, and Restaurant Payroll modules $125 each. Keller Systems, Inc., 305/833-3358.

Thinking Tools More than 250 electronic/electrical symbols in PICT format. $49.95. Thinking Tools, 301/383-6490.

3+ for Macintosh Extension of the 3+ network operating system that allows integration with IBM PCs and compatibles. 3Com Corp., 408/562-6400.

Traid Names Tool for developing new product, service, and business names. 512K min. memory. $159. Applied Systems and Technologies, Inc., 315/675-8584.

Word Finder 220,000-synonym thesaurus that installs as a DA. $59.95. Microlytics, 716/248-9150.

HARDWARE

ADC-1 Data acquisition and control system for external devices. Scientific data collection, process control, and energy management tasks. Price varies with model. Remote Measurement Systems, 206/328-2255.

DaynaFile External SCSI disk drive that lets a Mac read from and write to MS-DOS-formatted data disks while running Mac applications. $799. Dayna Communications, Inc., 801/531-0600.

hammer Hard Drive Series SCSI mass-storage sub-systems include 91MB internal hard disk for the Mac II, and 155- and 300MB external hard disks. Bundled with Hard Disk Partition, Hard Disk Util, and other commercial utilities. hammer91, $2495; 155, $3495; 300, $4595. FWB Software, 415/474-8055.

LaserWriter Accelerator Board Based on 68020 with 2MB of RAM. Under $2000. Blue Whale Technologies, 305/665-4665.

LBI Repeater Box Amplifier device for large offices that doubles the standard AppleTalk cable distance between Macs. $249. Lutzky-Baird Assoc., 818/347-7791.

(continues)

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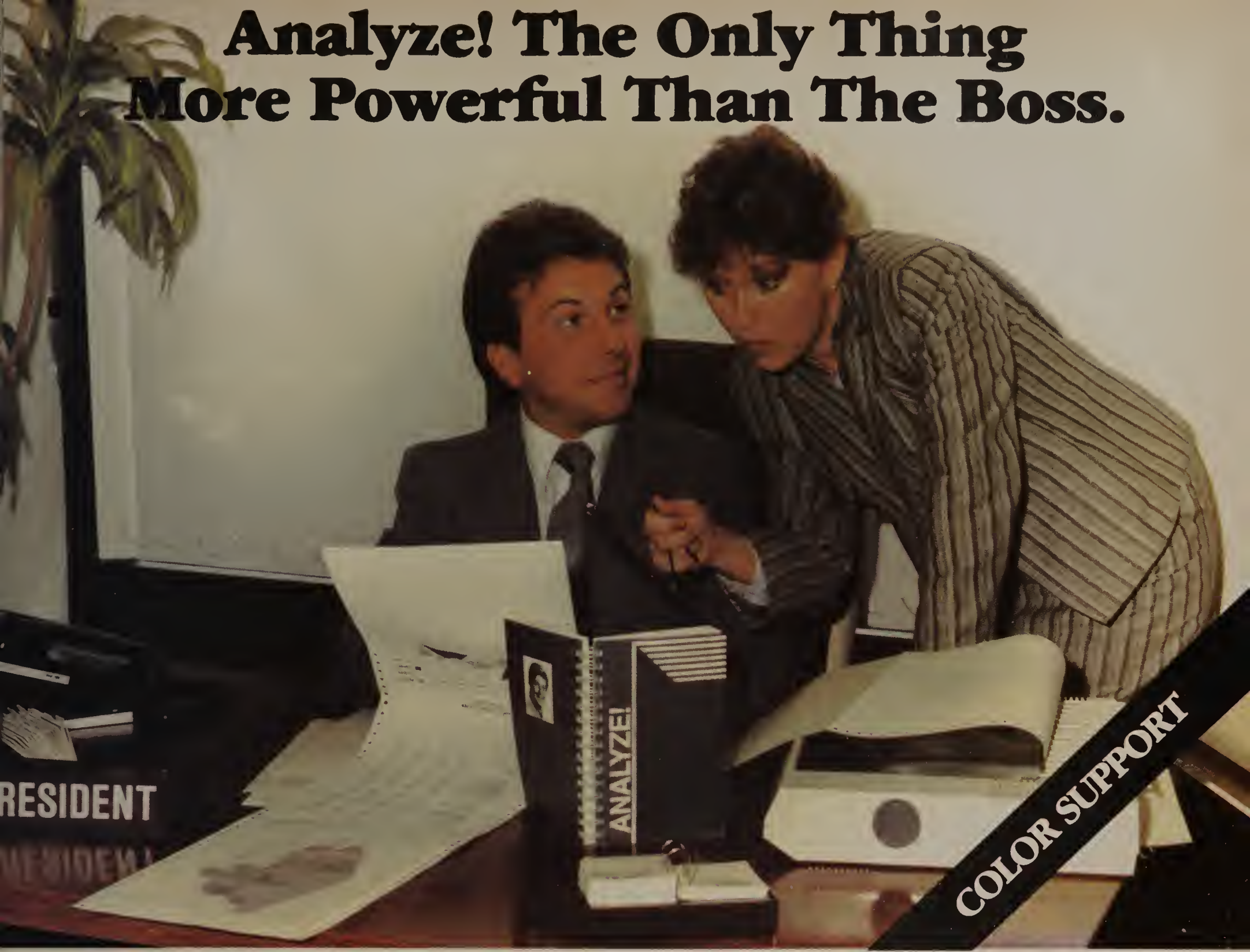

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The Macnifier Projection system that duplicates the Mac's video display in liquid quartz. Works in conjunction with an overhead projector. $1500; with collapsible projector $2495. Comtrex, 714/855-6600.

Mirror Internal Drives 300 SE and 450 SE and internal drives for the Mac SE. SCSI select and termination switch and shock mounts. Bundled with LaserSpeed and Personal SafetyNet. Optional shell houses displaced 800K drive. 300 SE $1095, 450 SE $1395; $100 rebate with return of 800K drive mechanism. Mirror Technologies, 612/426-3276.

Neotech Image Grabber Video digitizer with 768- by 576-pixel resolution. Full support for 8-bit gray-scale images in EPSF and TIFF. $1350. Neotech, Dorman Rd., Camberley, Surrey, GU15 3DF, England (telephone: 0276-685005).

TrueForm Hardware/software system for filling out any form on the Mac screen. Teaches the computer to fill in repetitive information. Includes scanner, SCSI interface, MacScan and TrueForm software. $1995. Spectrum Digital Systems, 608/244-4300, 800/541-6661.

TurboLaser/PS 8-ppm laser printer. Compatible with applications that use PostScript drivers. Input/output trays hold 250 sheets of paper. 35 built-in Adobe fonts. $3995, add-on PostScript board for current users $1995. AST Research, 714/863-1333.

ACCESSORIES

ClearPak Flexible, transparent storage device for 12 3½-in. disks. Optional binder (8½ by 14 in.). $3 each. ClearPak Designs, 312/262-6000.

CF Laseredge High-Resolution Papers Typesetting paper for high-contrast repro proofs from plain-paper imaging devices. Price varies with size, weight, and quantity. CG Graphic Arts Supply, 212/925-5332.

MousePouch Vinyl pocket that attaches to monitor's side for mouse or up to eight disks. $5.95. H&H Enterprises, 714/737-1376.

Porta Mac Organizer Desktop organizer for carrying Mac, mouse, keyboard, external drive, removable disk holder, power cord, and mouse pad. $125. Stratton Laboratory, 617/899-3498.

TR-300 Recharge Kit Recharging kit for laser printer toner cartridges. $27.95. Chenesko Products, 516/736-7977.

Ultrasuede Designer SoftWear Dust covers for the Mac 512K, Plus, and SE. Monogramming, appliquéing, imprinting, and silk screening services available. Call for price quotes. Designer Products, 918/299-1808, 800/223-2687. □

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Quick Tips

Answers to your questions

by Lon Poole

The June *Quick Tips* suggested capturing screen snapshots of the Key Caps keyboards you display by pressing the Shift, ⌘, or Option keys with the aid of the *Camera* desk accessory. Several readers have written to suggest the following easier method:

1. Open the Key Caps window and press a combination of Shift, ⌘, and Option keys to display the desired font set.
2. While pressing the keys, freeze the Key Caps display by placing the pointer over the Key Caps window title bar and pressing the mouse button. (You may also place the pointer at the upper-left corner of the screen.) Then release the keys—as long as you hold the mouse button down, the Key Caps display doesn't change.
3. While holding down the mouse button, press ⌘-Shift-3 to create a *MacPaint* document containing an image of the screen, ⌘-Shift-4 to print the screen image on an ImageWriter, or ⌘-Shift-Caps Lock-4 to print just the Key Caps window.
4. Let go of the mouse button to begin printing or saving to disk.

Thanks to Steven L. Harksen of Greenville, Texas, Arthur Tetley of Idaho Falls, Idaho, and Mark Johnson of Ibaraki-shi, Japan, for suggesting this method. *Camera* is still useful for making snapshots of the screen while you are pressing the mouse button, for example when you are looking at a menu.

Slim Macro Selects Fat Cell

June's *Quick Tips* also included an *Excel* macro for finding the cell that has the longest number of characters in a column. Bob Umlas of Palisades, New York, has submitted an elegant improvement. It uses *Excel*'s array processing to trim the macro from 44 lines to 13 (see "Fat Finder II").

This macro has a much simpler "user interface" than the one published in June. All you do is select any cell in the column you want to check, and run the macro. Instead of asking you to enter the number of cells in the column, the macro uses the function **SELECT.LAST.CELL()** to compute that number.

The key to this macro lies in cell A9. The LEN function normally works with one cell, but here it is used on a column of cells—that is, an array. Basically, the MATCH function compares the longest **MAX(LEN(SELECTION ()))** against each cell in the column. It reports the row number of the first cell whose length matches the longest cell's length. The formula in cell A9 subtracts 1 from that row number to get an offset from the first row. Using that offset, the formula in cell A11 then selects the desired cell.

When you enter the formula in cell A9 (by pressing the Enter key or clicking the Enter box), hold down the ⌘ key to make the formula an array formula. The macro won't work otherwise.

	A	B
1	widest.cell	Option-Command-w
2	=ECHO(FALSE)	Turn off screen update
3	=COLUMN(SELECTION())	Determine which column
4	=SELECT("R1C")	Select 1st row from that column
5	=DEFINE.NAME("col")	Call that cell "col"
6	=SELECT.LAST.CELL()	Select last cell on worksheet
7	=ROW(SELECTION())	Determine its row number
8	=SELECT(!col:OFFSET(!col,(A7-1),0))	Select all cells in column
9	=MATCH(MAX(LEN(SELECTION())),LEN(SELECTION()),0)-1	<==COMMAND-ENTER this cell—
10		uses array processing to find widest cell
11	=SELECT(OFFSET(!col,A9,0))	Select the widest cell
12	=DELETE.NAME("col")	Delete cell name
13	=ECHO(TRUE)	Turn on screen update
14	=RETURN()	End of macro

Fat Finder II
Select a cell in your worksheet, and this Excel *macro selects the cell with the most characters from the same column. Then you can adjust the column width to fit.*

Q Changing the Desktop Pattern

When I try to change the background on the desktop with the Control Panel, it changes in the Control Panel but not on the desktop. Any suggestions?

Larry Siegel
via CompuServe

A The Control Panel allows you to choose among 38 predefined desktop patterns or design your own. The Control Panel displays a miniature desktop, complete with miniature menu bar, where you change the desktop pattern (see "Pattern Picking"). (If you don't see the miniature desktop, click the General icon in the left part of the Control Panel.) To see the predefined patterns, click the tiny right or left arrows in the miniature menu bar. When you see a pattern you like, make it the desktop pattern by clicking on the miniature desktop.

To design your own pattern, use the magnified swatch next to the miniature desktop as you would use FatBits in *MacPaint*. Clicking on a white space turns it black, and clicking on a black space makes it white. As you change the magnified pattern, watch the miniature desktop next to it. Click the miniature desktop when you have the pattern you want.

Q Nonsense in WriteNow

I use the spelling checker in *WriteNow* extensively, but when I noticed that it was not picking up some typos, I investigated. I found the dictionary has some words that should not be there. Some, like *allous* and *orgasmatronx*, don't even exist. I've compiled a list of more than 1200 of

(continues)

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Pattern Picking
Use the Control Panel to change the desktop pattern. Click the miniature menu bar to see pattern choices and click below it when you see one you like. Or edit the magnified pattern using FatBits techniques.

these expendable words and nonwords that our department has found in the dictionary. You can remove them by selecting them and clicking *WriteNow*'s Forget button.

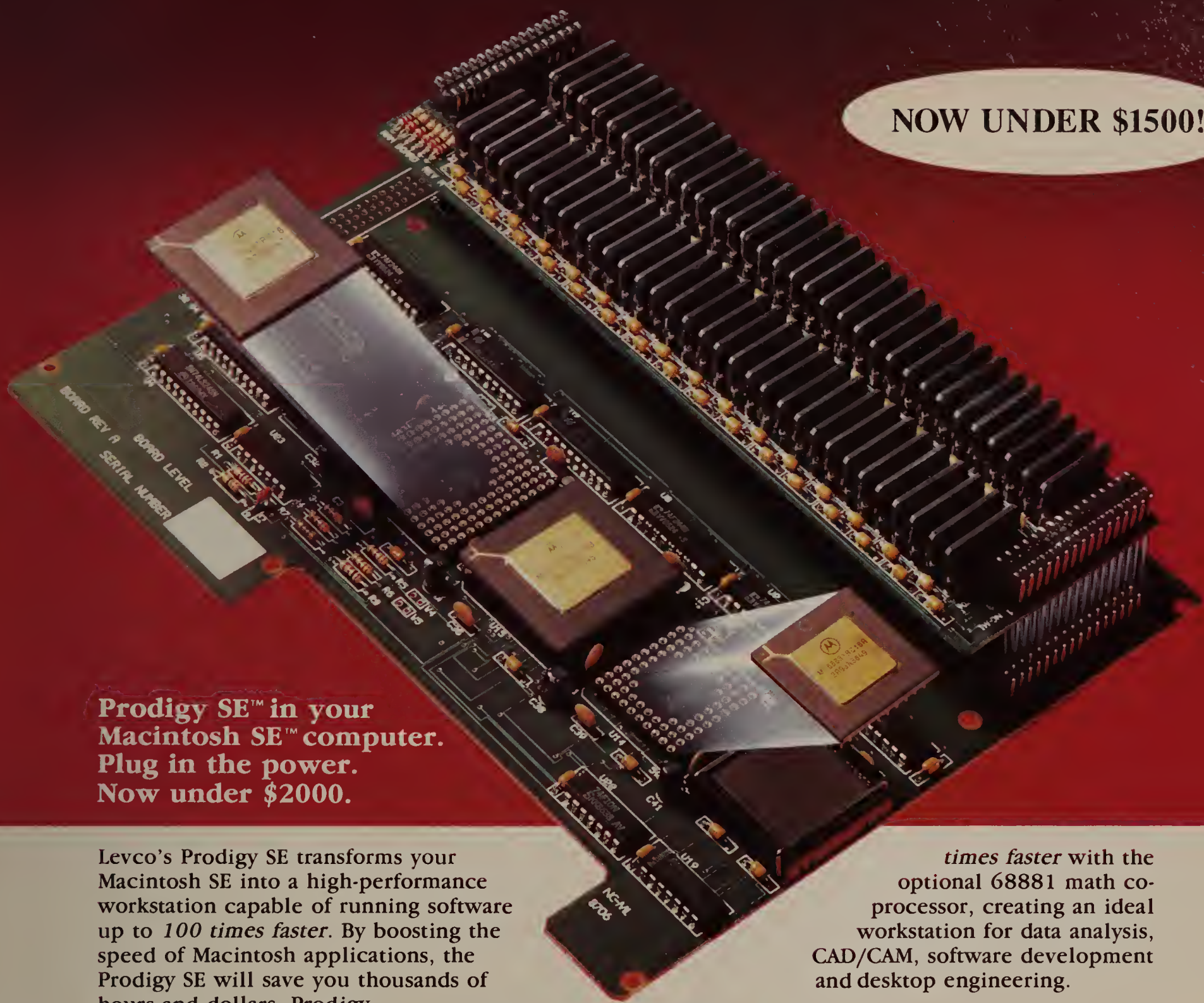
Why were the developers so sloppy?
Robert Holland
Milpitas, California

Don't remove those nonsense words! Doing so actually removes perfectly good words from the dictionary.

You may see some nonsense words among suggested alternatives to misspelled words, but they're not actually in the dictionary. *WriteNow* constructs a list of alternatives by manipulating the currently selected word when you click the Guess button. It may create a thousand derivatives from one misspelled word, many of them synthetic words. To winnow the bogus derivatives from the list, *WriteNow* checks the list against its dictionary. Because of the way *WriteNow* checks its dictionary, there's a statistical probability (1 in 80,000) that it won't catch a misspelled word. The nonsense words you see are spurious derivatives that *WriteNow* didn't catch.

WriteNow lets those counterfeit words pass as correctly spelled alternatives because it mistakes them for legitimate words in its dictionary. When looking up a word in its dictionary, *WriteNow* actually looks up a numeric code calculated from the word. If the program finds the calculated code in the dictionary, it assumes the spelling is accurate. By chance, a nonsense word may generate the same code as a legitimate word. If so, the nonsense word

(continues)



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seems genuine because its numeric code is in the dictionary.

If you remove a nonsense word you think is in the dictionary, you actually delete its numeric code from the dictionary. This effectively removes the genuine, correctly spelled word with the matching numeric. Unfortunately, there's no way for a *WriteNow* user to tell which real word is removed when a nonsense word is "removed."

WriteNow uses the coded lookup scheme because it's faster and uses much less disk space and memory than full-word lookups, according to John Anderson, who wrote the spelling checker. "All spelling checkers have trade-offs," he said. "Our top priorities were speed and the ability to check spelling in reduced memory environments such as *Switcher* and MultiFinder." He claims the *WriteNow* dictionary is clean and accurate. The checking method has a known error rate, as described in the *WriteNow* manual.

Window Tiles

Tip: *Microsoft Word* 3.0 has several window management features, including its Window menu and the ⌘-Option-W command that rotates through the open windows in turn. In addition, the program does window tiling. Clicking the zoom boxes of windows (or double-clicking their title bars or size boxes) shrinks the windows and arranges them so at least a portion of each window is visible.

Stanley K. Dorst
Pittsburgh, Pennsylvania

There's an exception to Word's *window tiling. If you resize or move a window after opening it and later click its zoom box (or double-click its title bar or size box),* Word *zooms the window to full size. Click again and the window assumes the size and location you gave it.*

Improve Your Score

Tip: I've heard people complain about *Professional Composer*'s inability to use different meter signatures simultaneously. Actually, it's quite easy to use different meters on different staves of a multipart score with Mark of the Unicorn's excellent manuscript program.

At any time, you can replace a meter signature on one staff with a signature you cut or copy from another place in the score. Start by setting up the meter signatures you need. To do that, insert the first time signature. Then add a bar line, insert another signature, and repeat until you've set up all the signatures the piece requires.

To substitute one signature for another, backspace to remove the signature you don't want. Then cut or copy the replacement signature from anywhere in the score and paste it at the spot just vacated. As long as you use equivalent meters in parallel measures across all the staves, the notation will be properly aligned (see "Many Meters Made").

Professional Composer has a different problem you can circumvent. Dynamic markings such as *forte* and *piano* sometimes collide with note heads, stems, or beams. To fix this situation, add a nonprinting 32nd rest where you want the dynamic marking. Then attach the dynamic to the 32nd rest (see "Dynamic Collision"). Be sure to do this on each staff, to keep the parts aligned. Only the dynamic marks appear when you print the document.

Rocky J. Reuter
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(continues)

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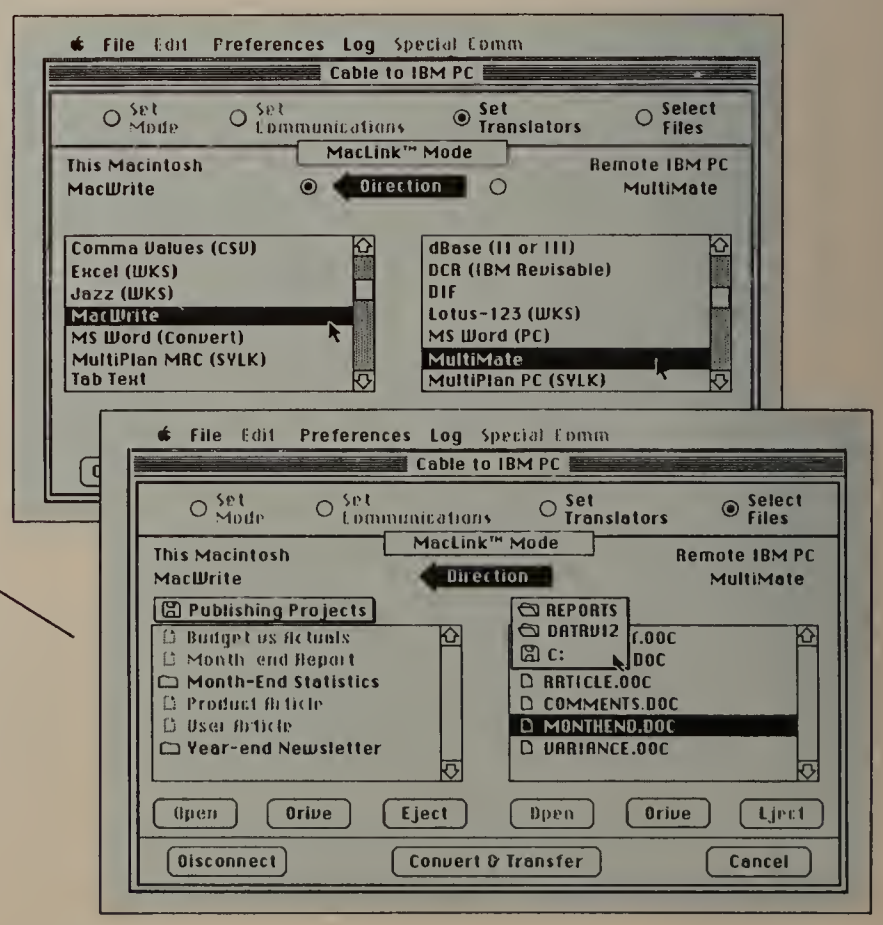

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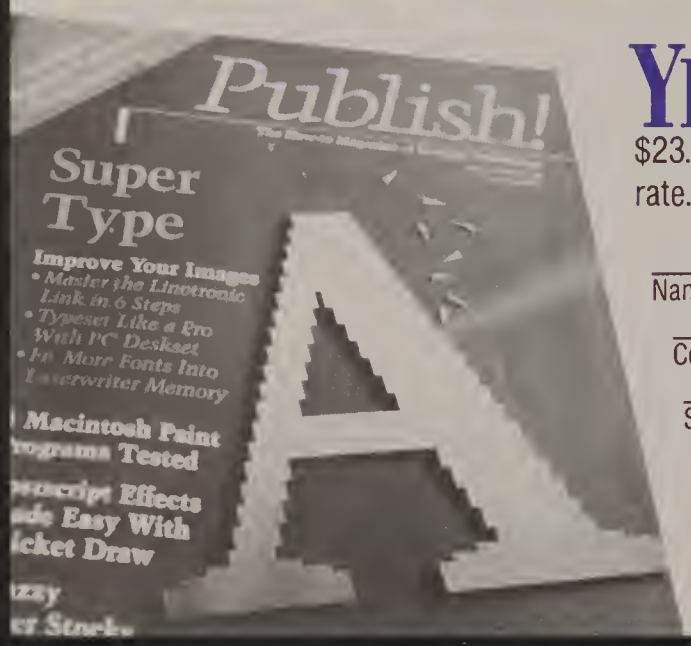

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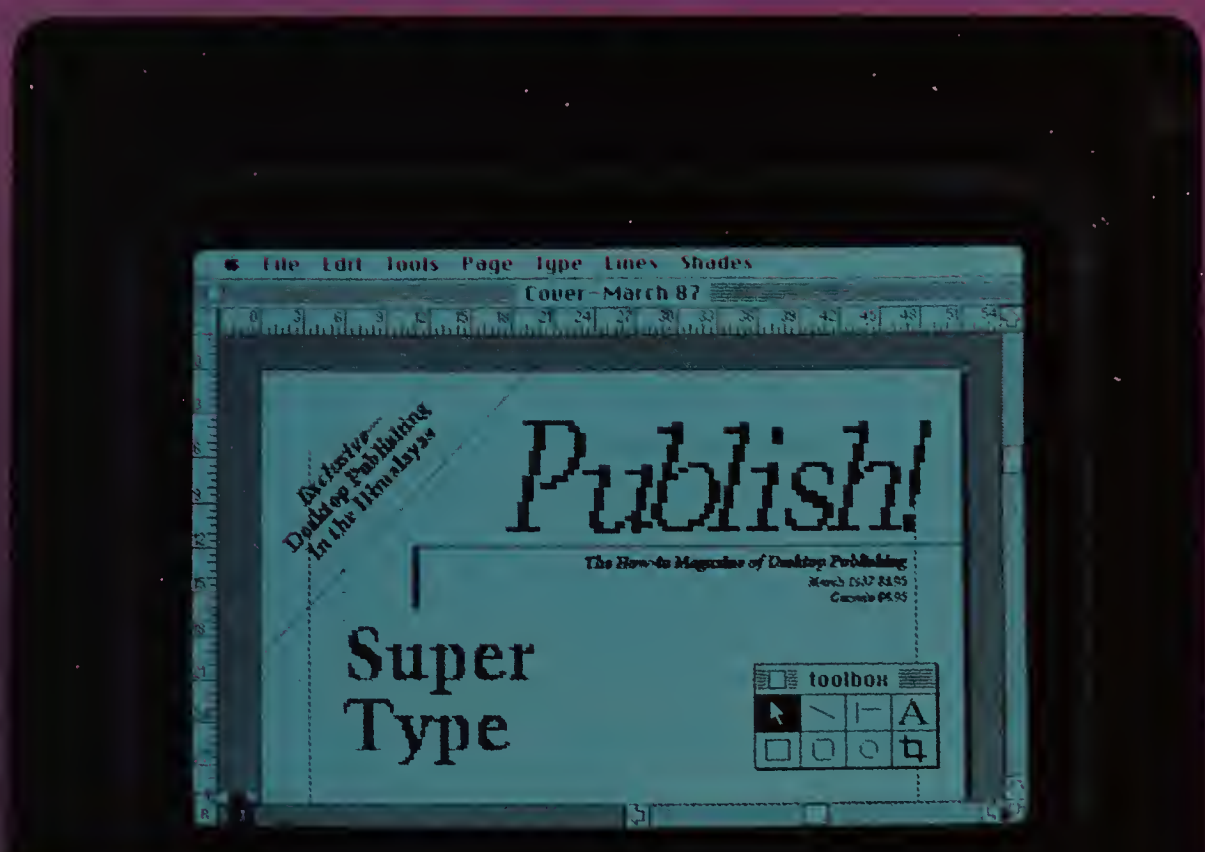

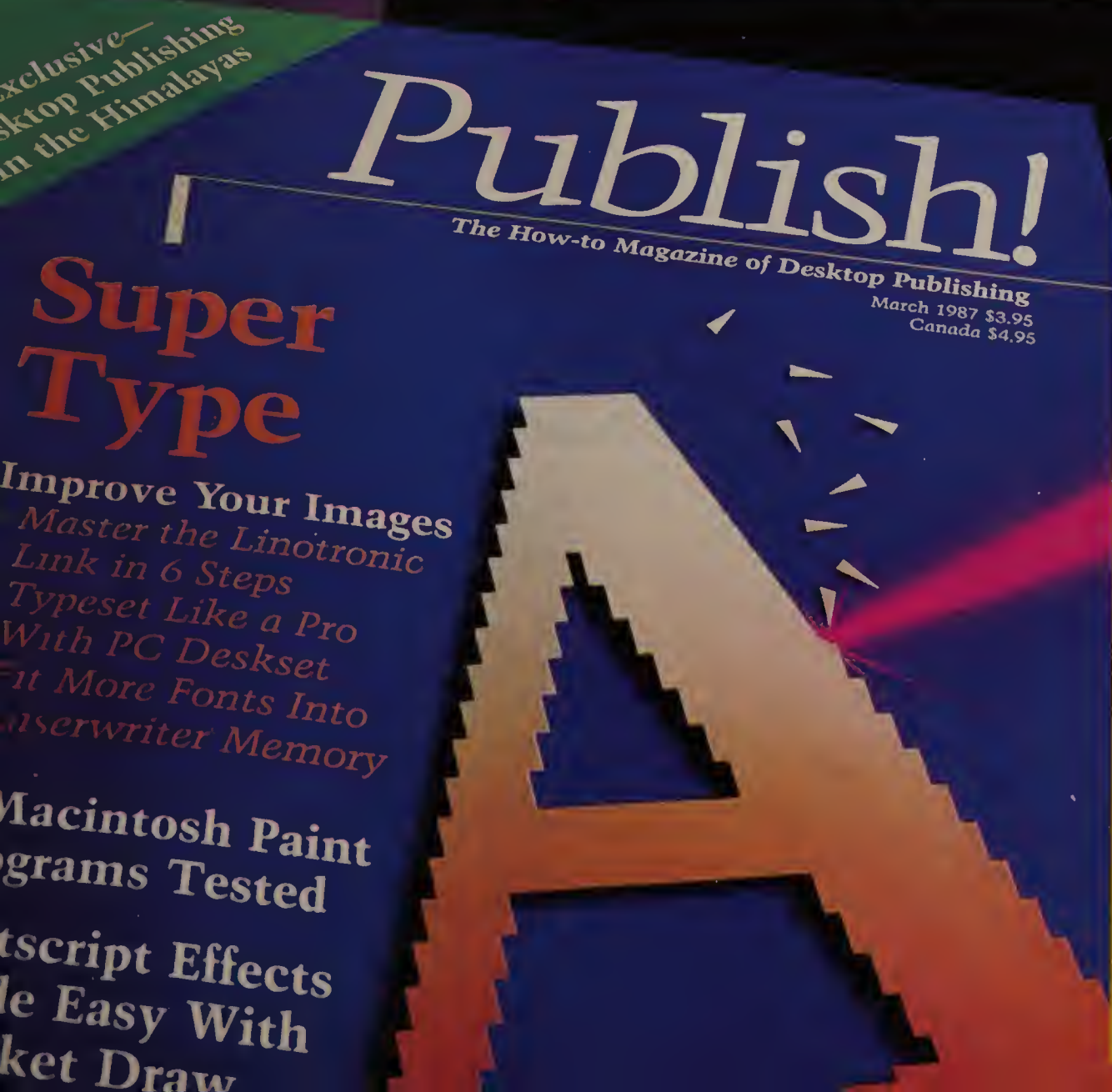

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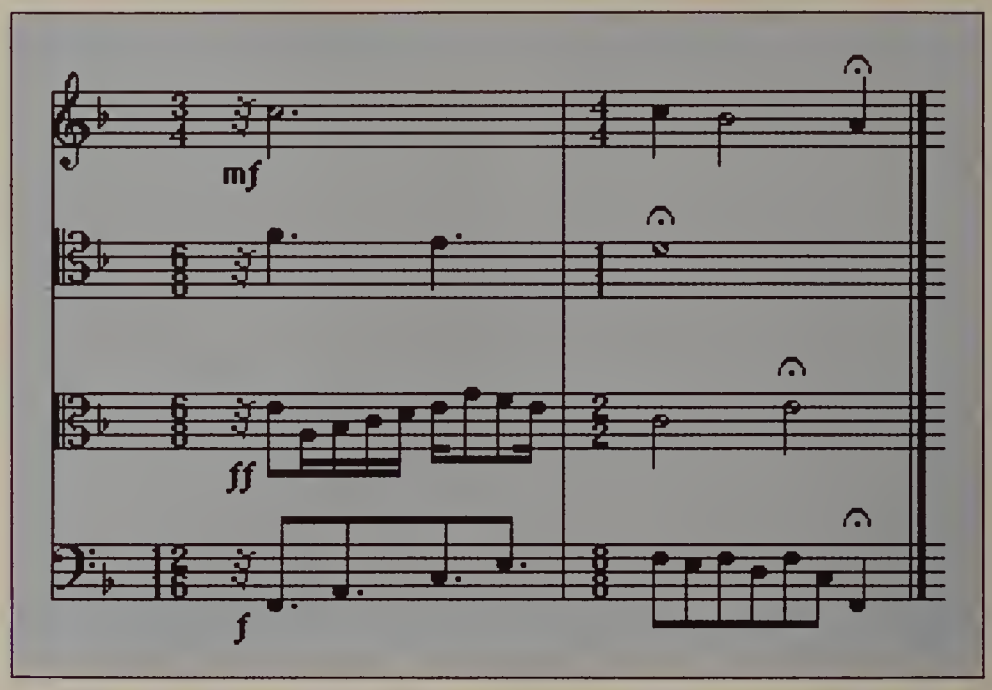

Dynamic Collision *Keep dynamics from colliding with notes in a* Professional Composer *score by attaching the notes to nonprinting 32nd rests.*

David Barnett of New York suggests a useful extension to the first tip. It allows mismatched time signatures on parallel measures, for example 5/4 on one staff and 4/4 on another staff. In the measure with more beats, use the Tuplet command and specify that the tuplet marking not be printed.

Thickening a Cricket Graph Plot

Tip: In *Cricket Graph,* the Overlay Plot button lets you add points from a new data set to an existing scatter or line plot. However, it won't let you overlay a data set with only one data point or a data set containing data that fall on a perfect vertical or horizontal line. If you try, a message pops up saying zero-range data can't be used. Even when the data points easily fall within the bounds of the established axes on the current plot, adding zero-range data is impossible. I have encountered many situations with real scientific data where this has been an issue.

You can trick *Cricket Graph* into overlaying a single data point. First, duplicate the one point in the data table where it appears. Do that by copying the data point from one row and pasting it to the next row in the data table. Then change the values in one of the two rows by some minuscule amount. Finally, overlay both data points on your graph. *Cricket Graph* plots the two nearly identical points on top of each other as if there were only one point. Suppose you have plotted cases 1 through 10 and want to add case 11, which has only one data point: $x = 3.5$, $y = 2.6$. Create a second data point for case 11 with $x = 3.50001$ and $y = 2.60001$. When you overlay the two points, they will appear as one on the graph.

A similar trick applies when adding or creating plots of data that fall on a vertical or horizontal line. To plot a horizontal line, for instance, just change one of the y values (vertical axis) by a trivial amount to make the y-range nonzero. Once they are plotted, you can change the range of the axes at will.

Jeffrey D. Lindsay
Appleton, Wisconsin

Reduce Scrolling

Tip: You can reduce the time spent scrolling to find documents you use regularly. Prefix the names of those documents

(continues)

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Orderly Arrangement
Prefix document and folder names with a digit, a symbol, or a letter to determine where they appear in an alphabetic list of names. The Macintosh sorts symbols, digits, and letters in the order shown here.

with the letter *A*, view by Name or Kind, and they will appear at the top of the list. Conversely, prefix items you don't often open with the letter *Z* so they appear at the bottom of the list.

Peggy A. Clark
Hartford, Wisconsin

That technique is safe to use on documents and folders you create, but may cause trouble if you use it on applications and special documents such as help files, dictionaries, and preference settings. In addition to letter prefixes, you can also use digits and symbols. The Macintosh sorts characters in the order shown in "Orderly Arrangement."

Mac under the Rising Sun

Tip: I have recently returned from a long stay in Japan and would like to pass on some tips about using a Macintosh there.

Macs sold in Japan have the garden-variety U.S. power supply. They work fine most of the time, but there can be a voltage problem. Japanese current is nominally 100 volts. (Half the country uses 50 Hz, and the other half uses 60 Hz. The dividing line is somewhere between Tokyo and Osaka, with Tokyo being in the 60 Hz region.) Many areas suffer brownouts in the afternoons, especially the Tokyo region. Voltage usually drops into the 90- to 95-volt range, and often drops as low as 85 volts. For some reason, this makes the Mac run hotter.

If you are not going to use your Mac in the afternoons, then there will be no problem. Otherwise, you will need a step-up transformer. These are available in Japan in wattages ranging from 30 to 1500. Prices start around $30.

Another point to remember is that most Japanese outlets are not grounded. In fact, my Mac came with a two-prong plug, which I replaced with a grounded three-prong plug. You need a grounded plug adapter, also available there. The transformers are two-prong types, but you can run a wire from the transformer base plate to a grounding point.

Modems pose an interesting problem. A U.S. modem, using the Bell standard and a plug-in adapter power supply, will work fine in Japan at 1200 baud, but will be illegal. Japanese modems use the CCITT standard; Bell modems are not approved. But the CCITT and Bell standards overlap at 1200 baud, so they are compatible. A Bell can connect to a CCITT at 1200, but not at any other rate. There is no problem (other than the high cost of the long-distance phone call) in calling up your favorite U.S. BBS from Japan using your U.S. modem. Most Japanese BBSs use 1200 baud, and several are in English.

Buy your software in the United States It usually costs twice as much in Japan.

Jerry Levinson
Honolulu, Hawaii

All modems sold for use on personal computers in the U.S. use the standard Bell 212A protocols. These protocols determine how information is converted from the digital form it has in a computer to the analog form it has in the phone system. ☐

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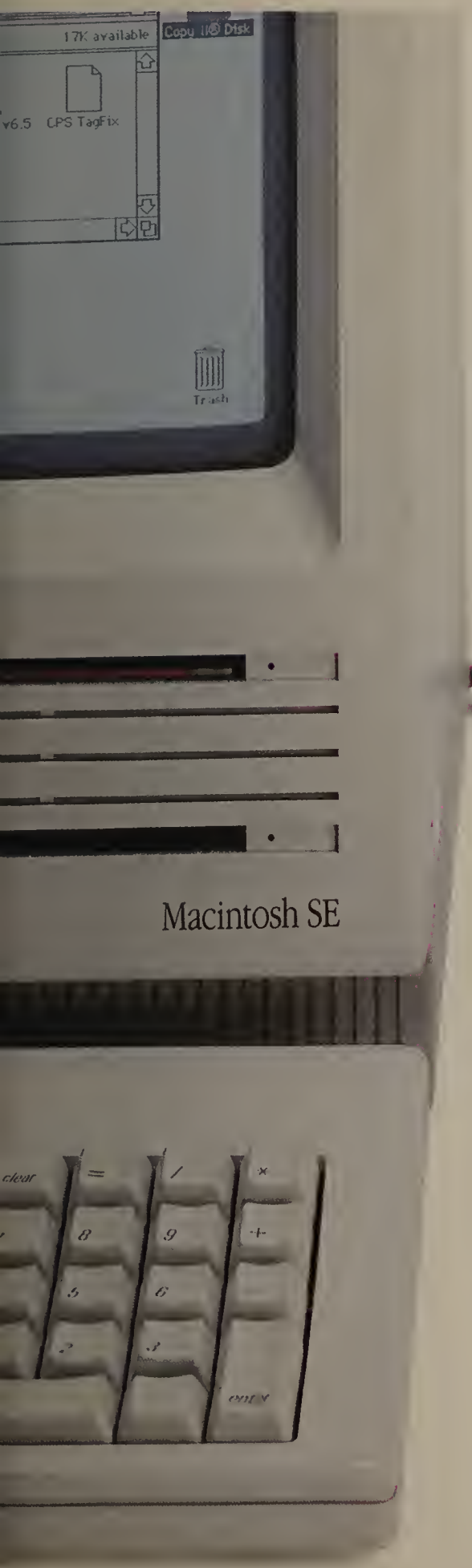

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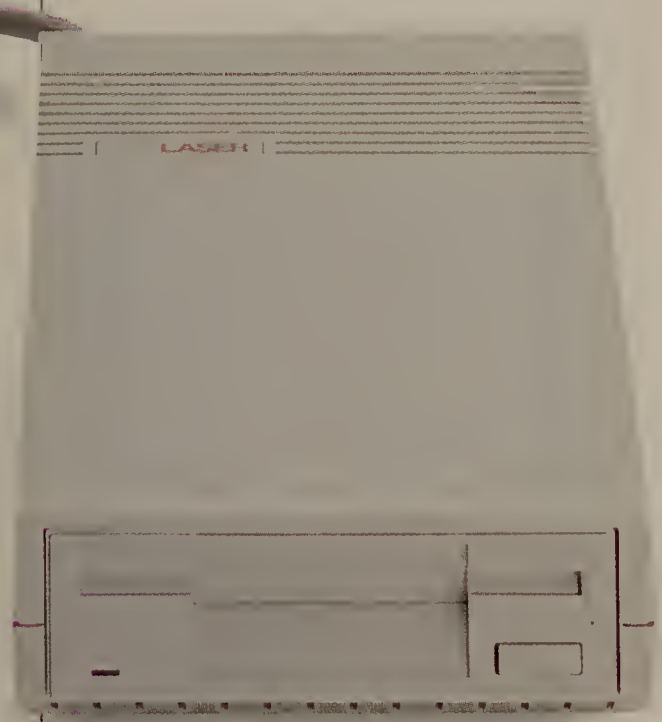

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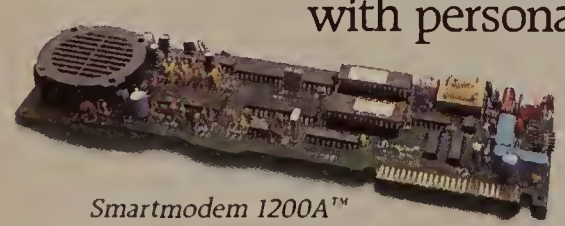
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Getting Started with Music

Scoring and sequencing, mastering MIDI, and outfitting your Mac to make music

by Jim Heid

MAX SEABAUGH

For Mac owners with a musical bent, this is a wonderful time to be alive. The Mac may be best known for changing the way people publish, but it's becoming a prominent force in the way people make music, too. Whether you're a beginner who has trouble pecking out *Chopsticks,* a film score composer, or lead guitarist for the Bleeding Eardrums, there's a place for the Mac in your musical life.

And you don't have to break the bank to find it. You can sample the world of computer music applications for nothing more than the price of a program and a cable to hook your Macintosh into a stereo system (see "Music on a Guitar String"). When you're ready to move up to a synthesizer, you'll be pleasantly surprised. The same electronics advances that have spawned $9.95 digital watches have made possible synthesizers that cost less than a color television. This month, I look at the ways in which you and a Mac can make beautiful music together.

Music to the Macs

The Macintosh is a multitalented performer. In fact, a Mac can play so many musical roles that it might help to briefly audition each type before examining the most popular ones (see "Music Makers").

■ *Sequencing* Several programs turn the Mac into an electronic multitrack recorder that records, edits, and plays back performances using one or more synthesizers attached to the Mac. The alchemy that makes this possible goes by the name Musical Instrument Digital Interface (MIDI), a synthesizer-communications standard built into virtually every synthesizer made today.

■ *Scoring* The process of putting notes on paper is traditionally a grueling task for composers, who must wrestle with staff paper and white-out, and for music-publishing houses, which usually use a mutated typewriter called a Musicwriter. Scoring programs will do for composers what word processors have done for writers.

■ *Composition* A fascinating new genre of programs, called *intelligent instruments,* lets the Mac collaborate with you by storing groups of phrases you have entered, analyzing their structure, and rearranging the notes into new rhythms and patterns based on the originals.

■ *Sound editing* On some synthesizers, adjusting the many knobs and but-

(continues)

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[1] *Requires only 128K memory. All others require a minimum of 512K memory.*
[2] *Requires 128K ROM.*
[3] *Bundled with* Professional Musician.

tons required to produce a desired sound is so difficult that many players stick with the instruments' built-in sounds, called *patches* (named in honor of the pioneering synthesizers of the sixties, whose many sound-generating modules were linked by patch cables like those for a telephone switchboard). Sound editing programs called *patch editors* let you draw and manipulate the *waveforms* that describe a sound's qualities, then transfer them to a synthesizer's memory.

■ *Patch management* Most synthesizers can store dozens of patches, but that isn't enough for real sound hounds. *Patch librarians* are database managers for patches; these programs transfer the settings making up each patch to or from a Macintosh disk. Patch librarians also let you cut and paste patches from one file to another, so you can organize sounds according to your performance needs. Many patch editors also provide librarian features.

■ *Sound track production* For years, film and recording studios have used a timing standard called the *SMPTE edit time*

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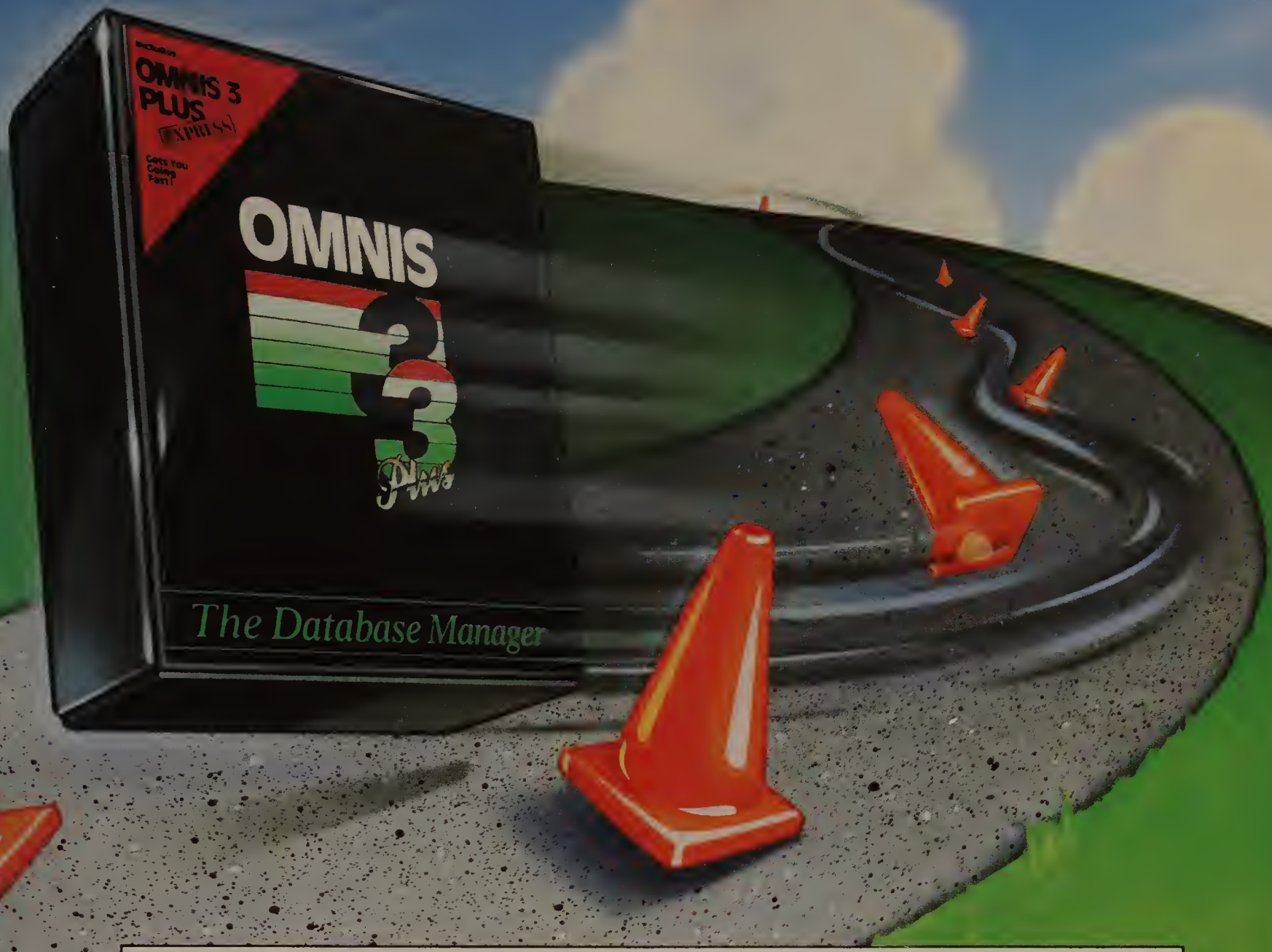

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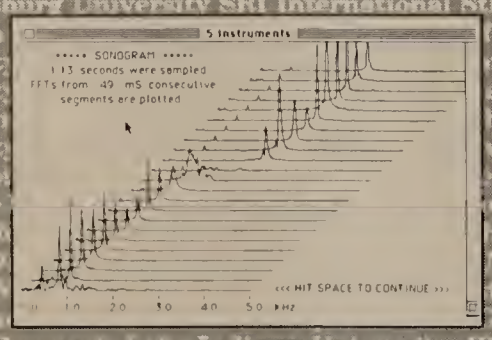

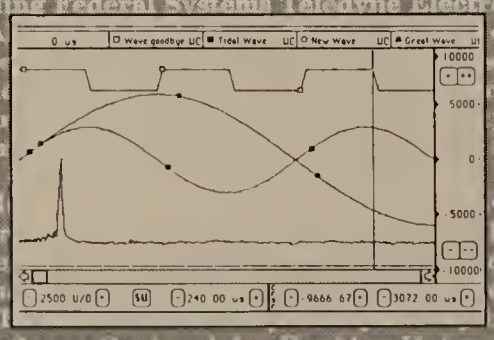

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code. (SMPTE, pronounced *simpty,* stands for Society of Motion Picture and Television Engineers.) The SMPTE code allows engineers to synchronize a sound track with an action. Many sequencers, as well as a new generation of *cue* programs, work with the SMPTE code to simplify the chore of calculating how long a musical passage must be in order to fit a given scene.

Songs for Beginners

You say you're neither a synthesizer owner nor a sound track composer? You can still choose from a combination of programs designed to let you sound off with a minimal musical background and no additional equipment. Foremost among such packages are Great Wave Software's *ConcertWare+*, Impulse's *Studio Session,* and MacroMind's *MusicWorks.* All are excellent introductions to computer music applications and share many traits with their more sophisticated siblings.

With all three programs, you enter music on conventional staves by using the mouse and on-screen palettes, which provide one-click access to note and rest values. *MusicWorks* also provides a *proportional-notation* display, in which notes with longer durations are wider. Unlike the symbols in conventional music notation, proportional notation provides a graphic indication of a note's duration (see "Making Note of It").

These programs also let you cut, copy, and paste passages and print your compositions. None of the three programs are intended to be scoring tools, however, so don't expect to find elements of music notation like tremolo slashes or glissando symbols. Such elements are the province of Electronic Arts' *Deluxe Music Construction Set,* Mark of the Unicorn's *Professional Composer,* or Southworth Music Systems' forthcoming *High Score* (see "From Keyboard to Score," *Macworld,* December 1986). These three take advantage of Adobe Systems' Sonata music font to produce sharp copy on LaserWriters and other PostScript printers.

Of the three programs in the suitable-for-beginners league, *ConcertWare+* has the best notation features. It also offers support for the Sonata font, the ability to add lyrics, and a unique Copy Picture command that copies part or all of a score to the Clipboard as a picture for pasting into *MacDraw* or a desktop publishing program.

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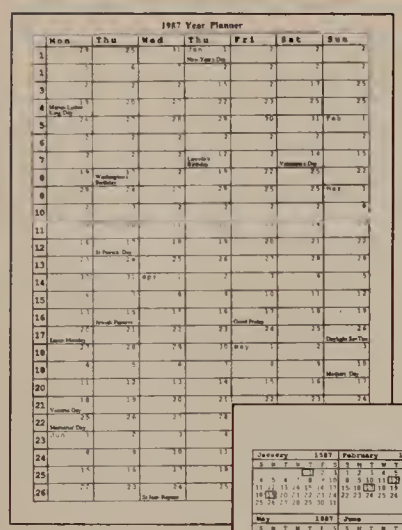

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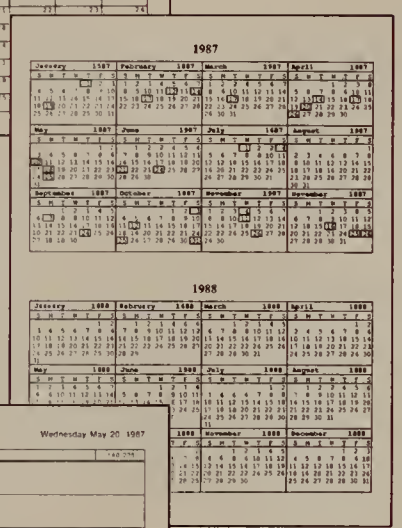

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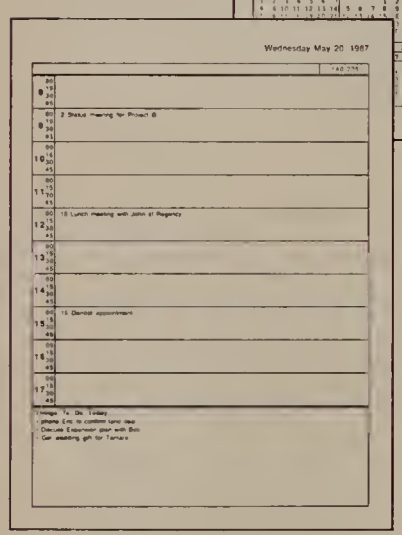

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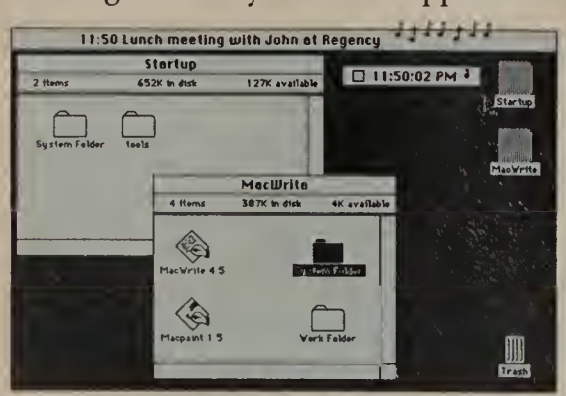

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Music on a Guitar String

Sampling the Mac music waters need not mean parting with an entire paycheck. *Concert-Ware+* ($69.95) lets you enter notes, print scores, play four-part music, and experiment with sound waves. For $89.95, *Studio Session* will introduce you to Macintosh-sampled instruments. If music notation and Sanskrit look the same to you, Opcode Systems' *Music Mouse* ($59.95) lets you make music with a mouse.

The Mac's built-in speaker wasn't intended to reproduce anything more than alert beeps, so attaching the Mac to a stereo system or a small external speaker will give you far better sound. To tap into a stereo system, use a cable with a 1/8-inch mini phone plug on one end that branches into two RCA phono plugs (Radio Shack catalog number 42-2153). If you need a longer cable, add a patch extension cord (Radio Shack catalog number 42-2353). Attach the mini phone plug to the jack to the right of the modem connector, as you face the back of the Mac; attach the RCA plugs to the AUX inputs on a receiver or an amplifier. To avoid damaging the speakers and your ears when the Mac beeps, turn the receiver's volume down and use the Control Panel desk accessory to turn the Mac's speaker volume down. After turning on the power, adjust both volume controls to a comfortable level.

ConcertWare+ is also the best of the three if you want to learn about sound. Using the package's Instrument Maker application, you draw and edit waveforms and define a sound *envelope,* which governs a sound's percussiveness. For example, a piano has a sharp *attack* (as the hammers hit the strings) and a gradual *decay* (as the strings stop vibrating and the sound fades out). Wind instruments have a gradual attack and little decay–until the musician runs out of breath.

Aural Gratification

Considering the Mac's limited sound-synthesizing capabilities, the end product of Instrument Maker is surprisingly good. But if it's not good enough for you, *ConcertWare+ MIDI* can send songs to a synthesizer–or let you enter songs from a synthesizer. If the notion of playing a song and then printing out its score sounds too good to be true, it is. Any performer's rendition of a piece varies from the precise timing specified by music notation. *ConcertWare+ MIDI*–and professional sequencer and scoring packages as well–must attempt to round off variances in timing through a process called *quantization.* Generally the process works well, but you still must fine-tune the final score.

If you don't have a synthesizer and you aren't happy with the Mac's attempt to imitate one, consider Bogas Productions' *Studio Session,* the first Mac music program to use *sampled* sound. Sampled sound is a digitized version of the real thing, produced by feeding an audio signal into a hardware device called an *analog-to-digital converter,* which turns a continuously varying (analog) sound wave–the kind our ears recognize–into a series of numbers stored by sampling software. If you've ever marveled at a compact disk's startling clarity, you've experienced the most common application of sampled sound.

As explained in "Sampling Sound," the quality of the more than 60 instrument sounds included with *Studio Session* can't approach a compact disk's realism. Still, it is remarkable. CompuServe and user-group libraries are brimming with songs and additional sounds, and you can create your own with the *Impulse Audio Digitizer,* whose *SoundCap* software was

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used to create *Studio Session*'s original sounds (see "Is It Live or Is It Mac?" *Macworld*, August 1986). Another feat that puts *Studio Session* a cut above its fellows is its ability to produce six simultaneous notes, or *voices*, instead of the usual four.

Synthesizers and MIDI

Six simultaneous Mac-sampled voices isn't bad, but if you're serious about music, it isn't enough. That's where synthesizers come in. The last five years have brought advances in synthesizer technology that make the microcomputer industry look sluggish.

The primary advance has been a boost in the price/performance ratio, and leading the way has been Casio. Its CZ-101 is a 10-pound, battery-operated marvel, with a 69-key miniature keyboard, 16 preset sounds, room for 16 of your own sounds, and a MIDI interface. It retails for $499, but I've seen it as low as $249. And it sounds great. Sequential, Korg, and Yamaha also make synthesizers for under $1000, and for a little more, you can have a sampling keyboard like Ensoniq's $1395 ESQ-1.

You play guitar? Don't fret. Roland Corporation and Octave Plateau Electronics manufacture MIDI guitar *controllers* that you can pair with any MIDI-equipped synthesizer. Drummers can make rhythm with Palmtree Instruments' Airdrums, two cylindrical sticks that are sensitive to acceleration in six directions. You wave the sticks around, and they generate MIDI signals for a standard synthesizer or a drum synthesizer called a *drum machine*. Horn players can play synthesizers via a MIDI-modified horn or a *breath controller*. Singers can serenade *pitch-to-MIDI* converters that translate audio signals into MIDI signals. In short, synthesizers aren't just for keyboard players anymore.

All of today's synthesizers come with built-in MIDI interfaces, but the Mac isn't similarly endowed. To attach a synthesizer to the Mac, you need a *MIDI adapter*, an add-on that plugs into the printer or modem port and converts MIDI signals into a stream of bits that the Mac recognizes, and vice versa. MIDI interfaces must have two basic connectors: a MIDI Out connector that transmits MIDI information, and a MIDI In connector that accepts it.

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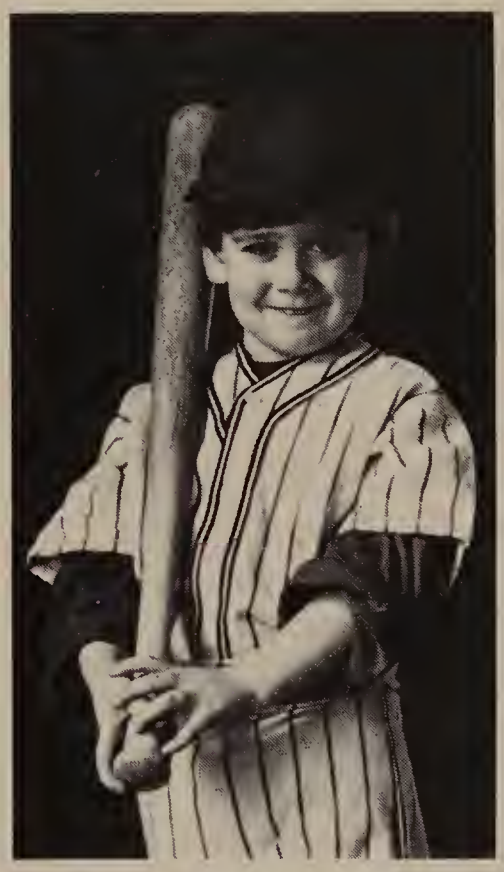

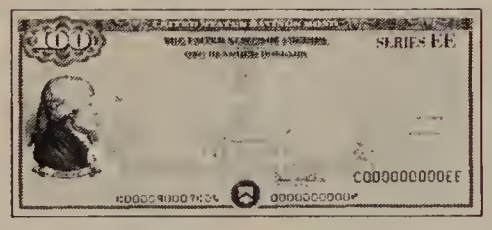

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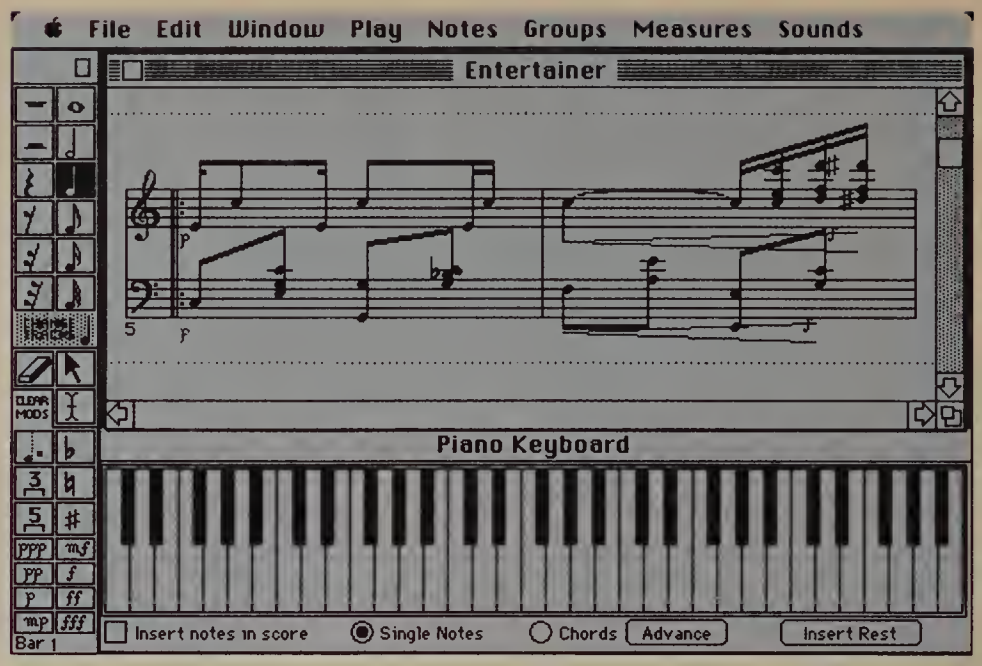

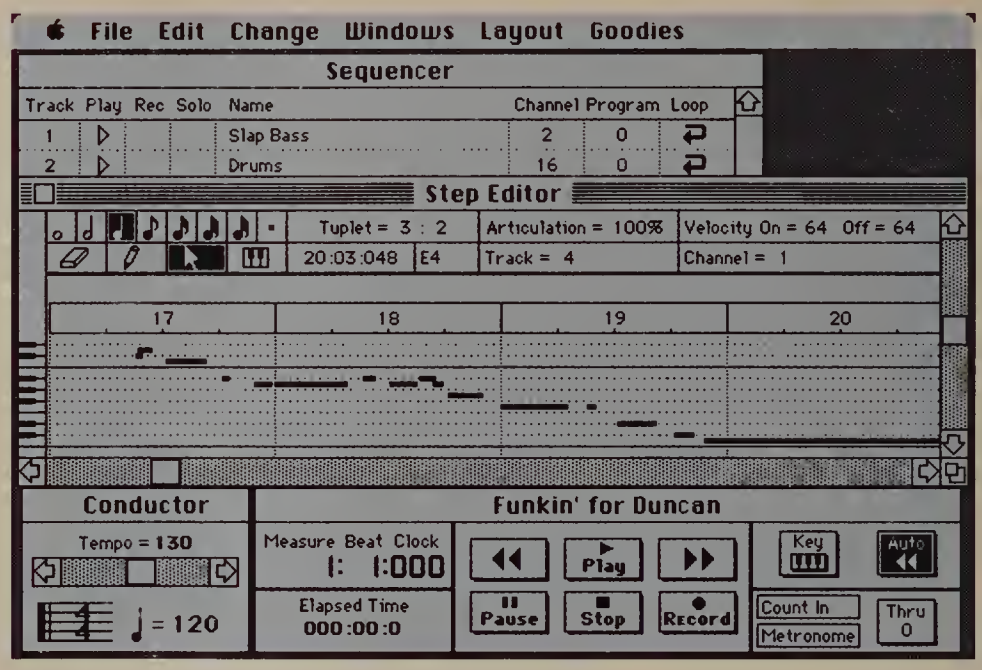

Making Note of It
Deluxe Music Construction Set *displays conventional symbols on staves.* Master Tracks Pro *MIDI sequencer shows a form of proportional notation: each note is a black bar, with pitch indicated by the piano keyboard at left and duration by the length of the bar; measure numbers appear at the top of each column.*

Opcode Systems offers a large selection of MIDI adapters. The Professional 512 and Professional Plus both offer one MIDI input and two MIDI outputs; the Studio Plus has two MIDI inputs (allowing you to record two keyboards simultaneously) and six MIDI outputs. Southworth Music Systems makes the more sophisticated Jam Box/4, which supports several time codes (including SMPTE), allowing you to synchronize a sequencer to a multitrack tape deck or to a drum machine.

A One-Mac Band

A MIDI link enables you to manage a synthesizer's sounds using patch editors and librarians, but the real fun begins when you add a sequencer program. So named because they store sequences of notes, sequencers turn the Mac into a tapeless tape deck. Click a Record button, and the sequencer stores the MIDI data that a synthesizer transmits when you play it—data that indicate what keys you pressed, how long you pressed them, and (with some synthesizers) how hard. When you're finished, click Rewind, then Play, and the synthesizer plays back your performance.

But that's just the beginning. Sequencers let you create complete arrangements by using MIDI's ability to control numerous synthesizers through 16 independent data channels. By playing back existing tracks while recording new ones, you could send a bass and chord accompaniment to Channel 1, a flute solo to Channel 2, and a horn section to Channel 3. And the sound quality of the recording won't suffer as you add tracks. Sequencers store MIDI data, not actual sounds, so every playback is an original performance.

If that doesn't sound sweet enough, sequencers also enable you to edit recorded sequences. *Looping* features cause

(continues)

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Firebird software for Apple and Macintosh systems, including the popular Elite, Golden Path, Starglider, Colossus Chess IV, Silicon Dreams, and Jewels of Darkness, is available from $24.95 to $44.95.

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certain tracks to repeat. Transposition commands change a sequence's key signature. Quantization commands correct timing errors. *Punch in* features play a piece up to a predetermined point, then snap into record mode to let you rerecord a passage. *Editing* features let you alter the characteristics of individual notes.

Sequencer shoppers have several impressive products to choose from. Indeed, there are more professional-quality Mac sequencers than there are word processors. The top three contenders are Mark of the Unicorn's *Performer,* Passport Design's *Master Tracks Pro,* and Southworth Music Systems' *MIDI Paint.* Opcode Systems' *Sequencer* was one of the first Mac sequencers, and while it has evolved into a powerful program over the years, it lacks the fine individual-note editing capabilities of its competitors. Unlike the other sequencers mentioned, which store one sequence per file, *Sequencer* lets you store up to 26 sequences per file and then create a master sequence that plays the others to create a complete song.

And there are more sequencers on the way. At this writing, Sonus Corporation was putting the final touches on its pro-oriented *MasterPiece,* which, like *Sequencer,* lets you combine separate sequences into a song. Lastly, Southworth Music Systems recently announced *One Step,* a $69 sequencer with much of *MIDI Paint*'s power, but designed for the newcomer.

Because the sequencers I just mentioned are all capable programs, it's best to audition them to find the one you're most comfortable with. One area to assess is the way each program lets you edit sequences. *Performer* takes a numeric approach that allows great precision but can be hard to use, while *MIDI Paint* and *Master Tracks Pro* both provide a visual editing window that shows notes on a proportional grid. You move or alter notes by dragging them, and you click on a note to display a *Performer*-like numeric editing window. *MasterPiece* offers both approaches in one window.

If you're interested in exchanging files with other sequencers, make sure your equipment supports the new *MIDI file* format. At this writing, the MIDI file format was close to being officially adopted by the MIDI Manufacturers Association. In the

(continues)

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Sampling Sound

You're already familiar with one form of sampling: the motion picture. By taking 24 separate photographs every second, a movie camera obtains a sampling of the continuously changing (analog) action in front of it. A projector then shows the samples at the same speed, and your eye and brain fill in the gaps, giving the illusion of continuous motion.

Sound sampling works similarly. By taking periodic "pictures" of a sound wave as a sound is produced, a computer obtains a set of numbers that represents the sound wave's shape. Each picture, or *sample,* is a numeric snapshot showing the sound's amplitude when the sample was taken. The computer then recreates the sound by supplying the numbers to a circuit called a *digital-to-analog converter,* which generates waveforms that closely resemble the original.

Sound is more difficult to sample than visual action because of the speed with which sound waves vibrate. The middle C on a piano produces a sound wave that repeats 261 times every second, while the highest C produces a 4186-cycle-per-second waveform. To accurately render sound within the audible range, which extends up to approximately 20,000 cycles per second, thousands of samples must be taken every second. The faster the *sampling rate,* the more accurate the picture of the original sound becomes. Digital audio equipment takes 44,100 samples every second. Because the Mac Plus and SE must also spend time managing memory, creating screen displays, and handling other chores, they're limited to roughly 22,000 samples per second—not swift enough to earn a place in your stereo system, but fast enough to sound at least as good as an inexpensive table radio.

Another factor that influences sound quality is the sampling *resolution*—the ability of the computer to recognize changes in loudness of the sound being sampled. Compact disk equipment uses 14-bit sampling, meaning it's able to recognize and reproduce 16,000 different loudness levels—more than the human ear can discern. The Macintosh uses 8-bit sampling and is able to recognize only 255 dynamic levels. When the dynamic level of a sample lies between two points, the Mac rounds it off to the nearest level. This approximation results in sampling errors that you hear as noise.

The Mac II can sample at 44,100 samples per second but, like other Macs, it uses only 8 bits of resolution. Other improvements in the Mac II's audio circuitry give it better sound-reproduction capabilities than the Plus and the SE have, but don't expect to see any wine goblets shatter in front of Mac II speakers.

The Mac II's real potential in sound sampling lies in its speed and expandability. For example, Southworth Music Systems is developing a 24-bit sound sampling board equipped with a high-speed *signal processing* microprocessor. Forthcoming boards will turn the Mac II into a professional-quality digital recorder.

meantime, this format is gaining momentum as an unofficial standard in the Mac sequencer field.

Smart Songsters

I could talk about sequencers until I run into the *Macworld Best-Sellers* page, but I wouldn't be doing justice to another fascinating category of music software: intelligent instrument programs. These software collaborators store and analyze phrases and then improvise music with some characteristics of the originals.

Musical Luddites who aim their noses skyward at the notion of computer-composed music haven't played with *Jam Factory,* one of three intelligent instrument programs from Intelligent Music. In *Jam Factory,* four "players" store notes you play at a MIDI keyboard, and then the program analyzes the music. From there, the program generates new passages that contain the notes you played, but in a more random order. The order isn't completely random, however, because the probability of a given note occurring depends on how often it occurred in the original phrase. That's what allows *Jam Factory*'s improvisations to resemble the original phrases.

The basic concepts behind *Jam Factory* aren't new. In 1961, computer music scientists developed what they called an analog composing machine. In one experiment, they used it to analyze Stephen Foster songs and compose new songs that had that Dixie flavor. And even Mozart once experimented with random composition, using dice to choose notes, then building a melody and supporting harmony based on those selections.

Jam Factory would make the flamboyant Amadeus squeal with glee. The screen is jam-packed with performance controls, buttons, and graphs for altering the phrases *Jam Factory* plays—their tempo, rhythm, randomness, key signature, and more. *Jam Factory* turns the Mac into a musical instrument, letting you change the program's renditions of your phrases by "playing" the on-screen controls. You can store the results of a performance, commit that flash of brilliance to disk, and replay it later.

If it sounds to you like there's more to *Jam Factory* than I've described, you're

(continues)

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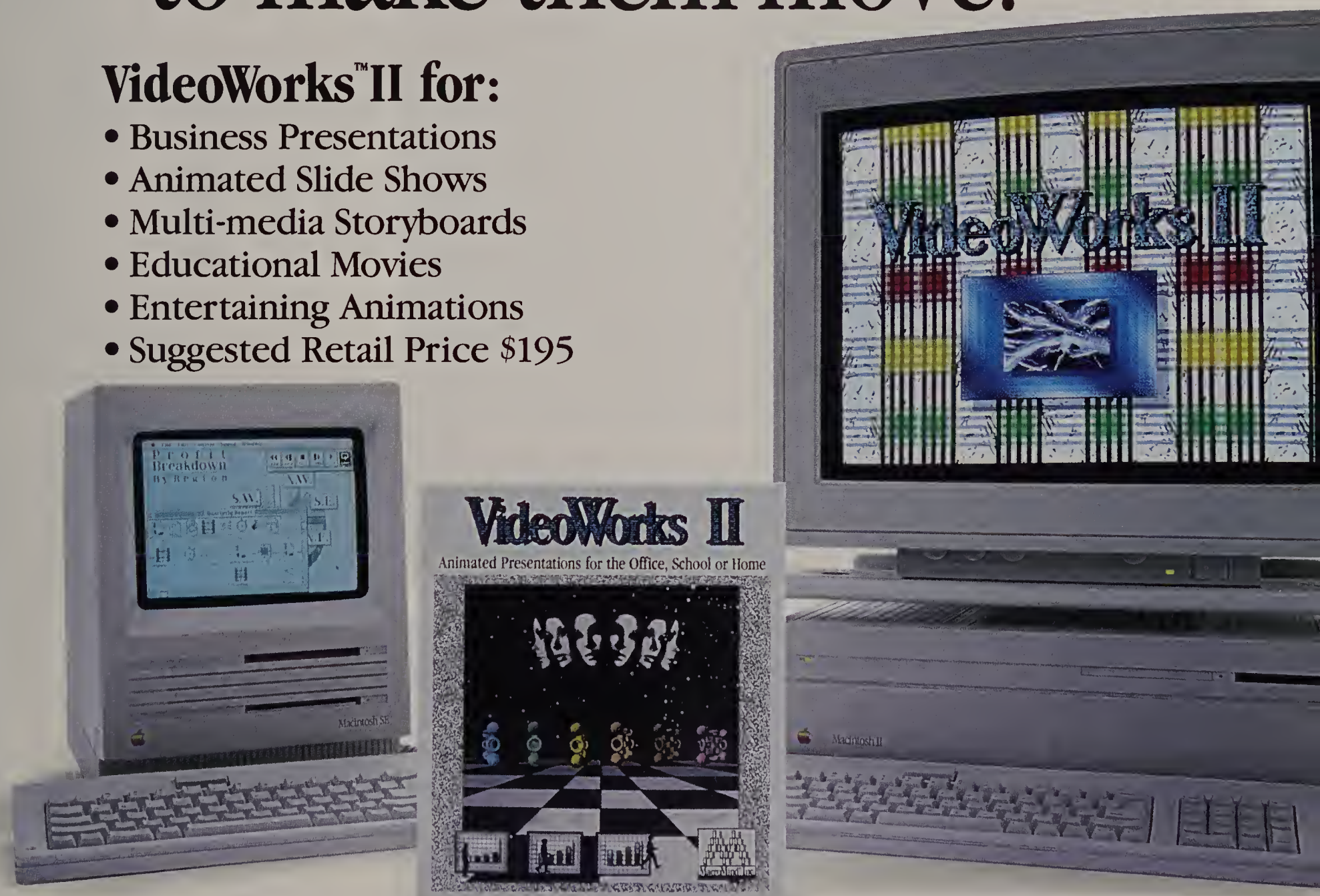

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right. Intelligent Music wisely offers a $5 demonstration disk that lets you experience the program for yourself. While you're at it, get the demo disks ($5 each) for *Jam Factory*'s cousins–*M,* a composition and performance program, and *UpBeat,* an intelligent rhythm program designed for use with drum machines. *UpBeat* takes basic rhythms that you enter and devises accents and fills that take the mechanized "boom-chaka-boom" feel out of drum synthesizers.

Another fun program in the intelligent music class is Laurie Spiegel's *Music Mouse,* available from Opcode Systems. *Music Mouse* requires no keyboard or note-reading skills: it turns the Mac into a musical instrument by drawing a grid on the screen over which you drag the pointer to create music, which plays through the Mac's speaker or a MIDI synthesizer. *Music Mouse* isn't intelligent in the sense of improvising phrases, but in that it creates harmonies in any of five scales as you drag the mouse. At $59.95, it's an inexpensive and easy way to make music.

Fade Out

If you want to learn more about computer music applications and synthesizers, consider a subscription to *Keyboard* magazine ($19.95 per year from GPI Publications, 20085 Stevens Creek, Cupertino, CA 95015). Each month *Keyboard* reviews the latest in synthesizers and computer software, but not at the expense of the creative aspects of music making. David Crombie's book *The New Complete Synthesizer* (Omnibus Press, 1986) provides an excellent introduction to synthesizer technology.

The Mac has quickly become the computer of choice for music applications, and the future sounds even better. The Mac II, with its faster processing and expandability, will play a large role in sampling and professional audio applications. Synthesizer makers will continue to cram more and better sounds into less-expensive packages, and increasingly intelligent music packages will enable music lovers with less-than-virtuoso keyboard skills to experience the joy of listening to their own music.

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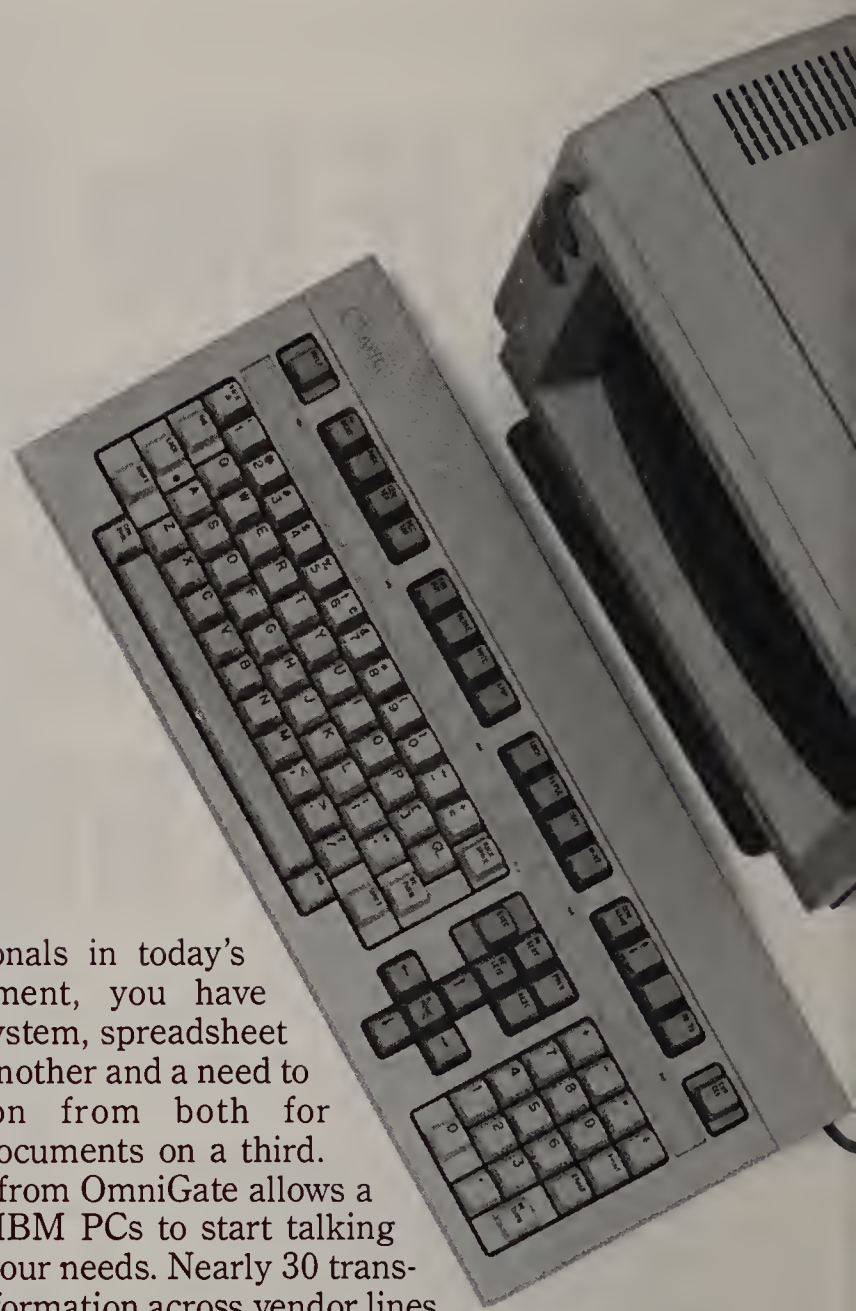

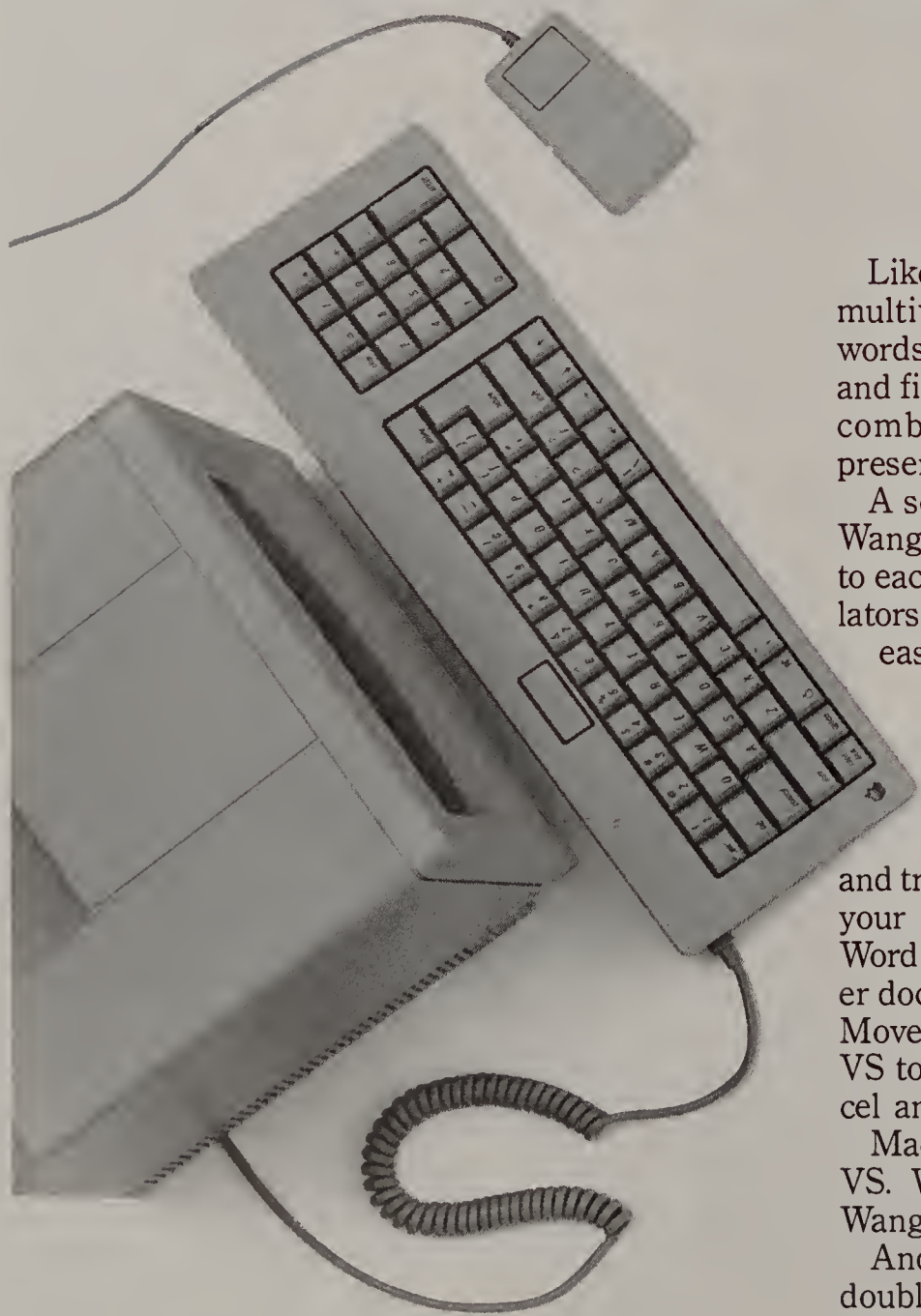

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Insights on Quark XPress

Text, font, and page-layout tips to make the life of the electronic publisher a little easier

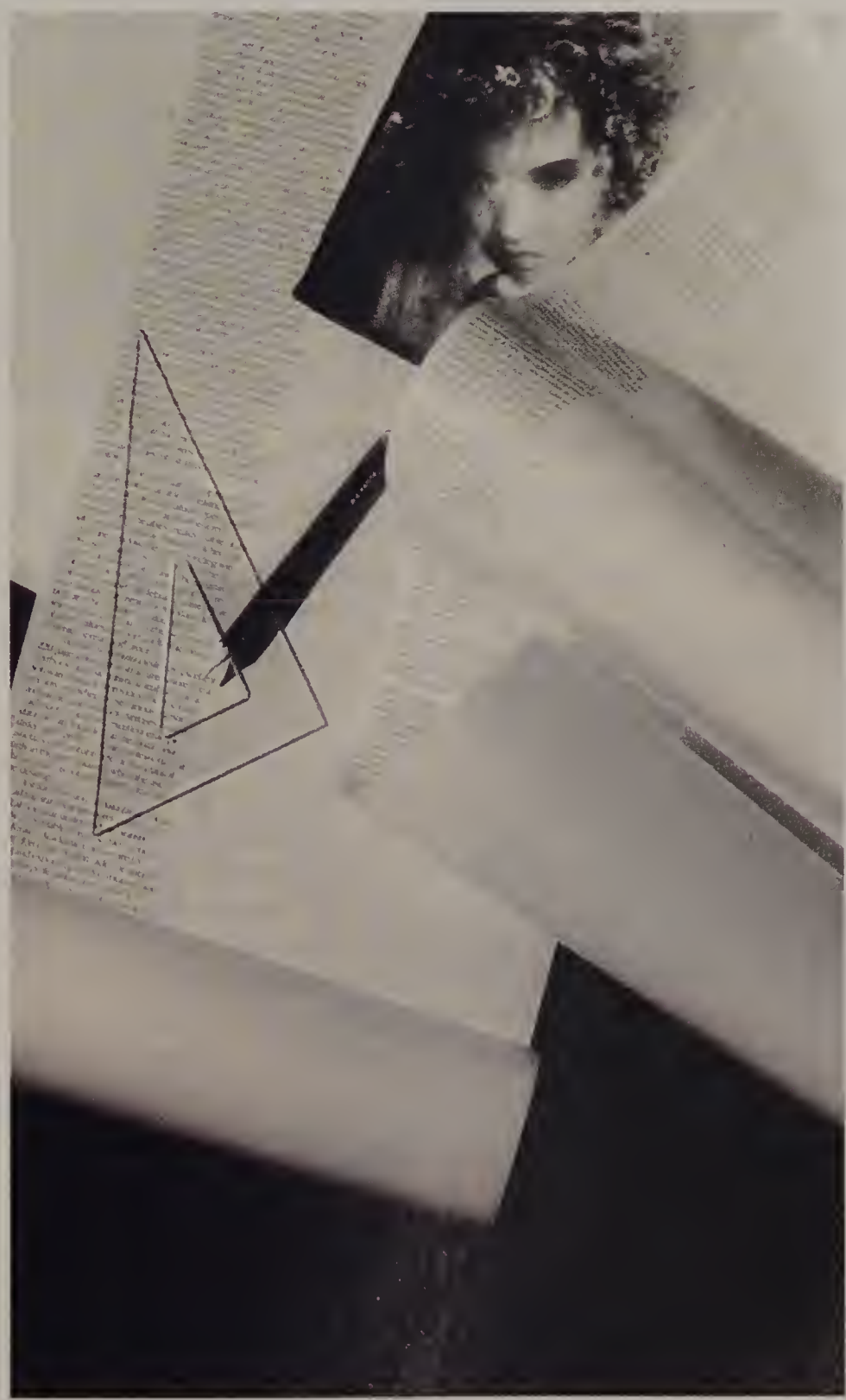
by Valerie Kuletz

In the beginning there was *PageMaker,* a program that was difficult enough for those unschooled in text manipulation and graphic composition—a craft requiring considerable skill and knowledge of design, typography, and applications. Today, a number of other complex third-generation programs offer features that many people lack the background to use. In fact, the current crop of desktop publishing programs has become so sophisticated that it's easy to feel overwhelmed. *Quark XPress* 1.03 is no exception.

You can use *XPress* for publications ranging from newsletters and magazines to reports, short books, and manuals. It features a powerful word processor and an impressive collection of text-control tools such as kerning, automatic hyphenation, and tracking (global kerning). *XPress* also offers color separation; the ability to wrap text around arbitrary shapes; and batch pagination, which allows you to format long manuscripts by simply placing the first column.

Many of *XPress*'s features imply flexibility and versatility. However, they can confuse both beginners and seasoned desktop publishers. For example, flowing text through columns and jumping across pages is a great feature, but too often "continued on page 10" bears no resemblance to reality. Since few of us are expert users of all the various graphics, text, printing, and page-composition tools featured in *XPress,* and since the manual won't answer all your questions, here's a collection of tips that should make life with *XPress* a little easier.

I would like to give special thanks to Robert Cowart for his invaluable research and testing of *XPress.* I would also like to thank *XPress* users Ed Nies, Joel Leipzig, and Jim Morton for their research contributions.



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Text Tips

XPress's text handling lends a great deal of typographic control, but you have to know how to use it. These tips help you save time and avoid frustration when you're working with the rich assortment of text tools.

Hyphenation

XPress's automatic hyphenation provides two ways to suppress hyphenation of a particular word. To prevent hyphenation of all occurrences, add the word to the Hyphenation Exceptions list. Don't hyphenate words on the exception list: enter *procrastinate* rather than *pro-cras-tin-ate*. To avoid hyphenating a single occurrence of a word, place the insertion point just before the word and press ⌘-hyphen.

Large Type with Small Type

Once upon a medieval time, monks labored in solitude to produce stunning illuminated letters at the beginning of a passage. The drop caps that designers use today usually come ready-made from a type font, but positioning them in *Xpress* still requires some effort.

To control the amount of space between the large type and surrounding text, use three boxes instead of just one for the drop cap and one for the smaller text. First position the drop cap and make its box transparent so the text flows around the letter. If the text hugs the large type too closely, create a third (nontransparent) text block for the drop cap, slightly larger than its original box, to act as a placeholder. Resize this buffer box (by its handles) to adjust the spacing.

Creating Headlines

Suppose you want to align a single-column headline with the text in the adjoining column. If you type the headline into the body-text block and change its font size, you may throw off the horizontal alignment. So when placing headlines on multicolumned pages, create a separate text box to hold the headline text. Then, after you flow your body text into the columns, resize the headline box to force the text to reflow until it's aligned. Keep adjusting the position of the headline box until the baseline across columns is even (see "Matching Headlines to Text").

(continues)

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Use LaserWriter to create line screens and frames.

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Importing

XPress 1.03 can't read *Microsoft Word* 3.0 files directly; you must convert them into ASCII text or *Word* 1.05 format before importing. (Quark expects the next version of *XPress* to be compatible with *Word* 3.0.)

Speed-Selecting

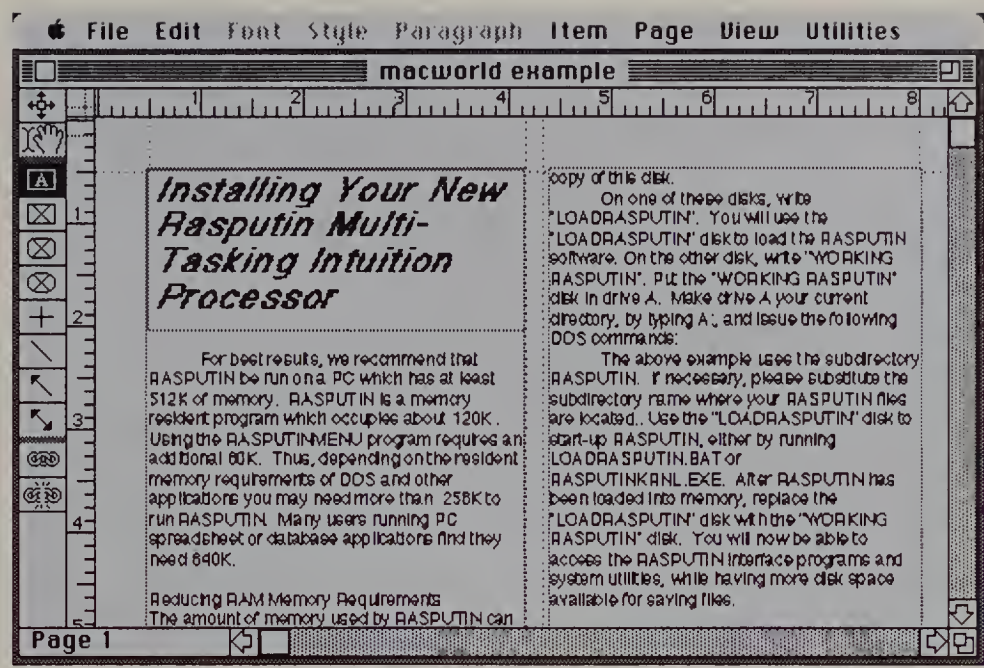
Don't forget that *XPress* lets you triple-click to select a line, quadruple-click to select a paragraph, and quintuple-click to select all the text in a chain.

Text Wraparound

The Text Outset command for picture boxes lets you specify the amount of white space between a graphic box and the text that flows around it. But there's a hitch: you must use the rectangular-box tool, not the rounded-corner one, if you want to adjust the white space.

Linking

After you finish with the text-linking tool, be sure to deselect it by switching to another tool; otherwise one misplaced mouse click could wreak havoc on the structure of your document.



Matching Headlines to Text

Use a separate text box to insert a headline in the text area of a two-column layout. Then you can adjust the size of the headline box to move the body text until the adjacent column's baselines are matched.

Page Layout and Graphic Design

Page-layout possibilities seem endless, but so do the complications. A few tips can take some of the guesswork out of your page makeup.

Column and Graphic Combos

Multicolumn layouts present particular problems. For example, if you've set up a three-column grid for your text, how do you put two graphics side by side in the middle of page 5? If you position them without the aid of the grid, chances are you won't align them precisely enough. Instead, create a new text box that spans all three columns and position it where you want the graphics inserted. With the Modify command, change the number of columns to two. Then draw two graphics boxes in the new text block and load the art files as usual.

(continues)

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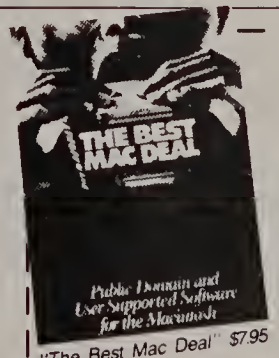

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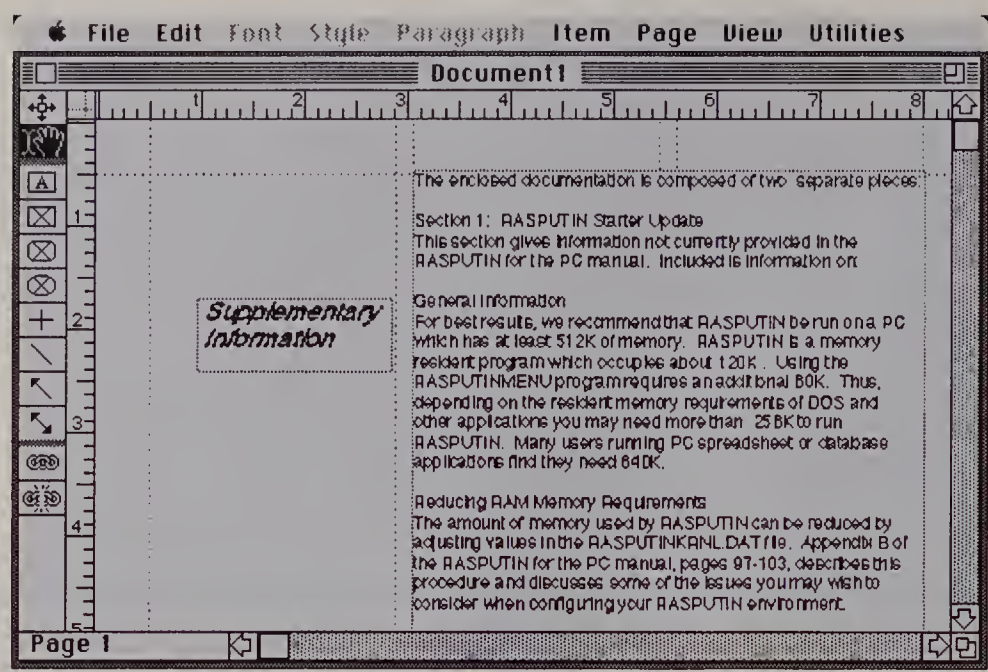
Making a Mac-like Manual

XPress *enables you to create a professional-looking manual in the Macintosh documentation format.*



Positioning Text and Graphics

To accurately position text and graphics boxes, position the first box and then move the ruler's zero point to correspond to either the box's horizontal or vertical alignment. That makes it easy to align additional boxes by selecting Modify from the Item menu. You don't have to use the zero point, but if you don't, you must write down or remember the coordinates.

Marginalia

Suppose you want to create a multicolumn manual with the left column reserved for subheadings (called *hanging heads* when all text beneath them is indented), thumbnail drawings such as icons, and special notes to readers. It's a familiar Mac manual design, but it takes an extra step to prevent the main text from flowing into the left column (see "Making a Mac-like Manual").

The secret is to delete the text block for the left column and then create a separate text box for anything that belongs in the reserved column and align it with the corresponding text. Because there is no way to "lock" the left-column items to the text they belong with, heavy editing, insertion of text or picture boxes, or any other significant change will force you to reposition left-column material. To avoid tediously tracking the migration, you could leave subheadings and notes destined for the left column within the main body of text until the end of the editing process.

Makeshift Style Guides

XPress lacks style guides, but you can devise your own by creating a file of model paragraphs (as short as a single word or letter) for formats you use often. Shrink this formats-file window and move it off to the side. When you open your document, resize it so that your small "formats" window stays in sight. Now you can jump back and forth between the document and your "style guide," copying the paragraph formats to your target document (see "Making Style Guides").

(continues)

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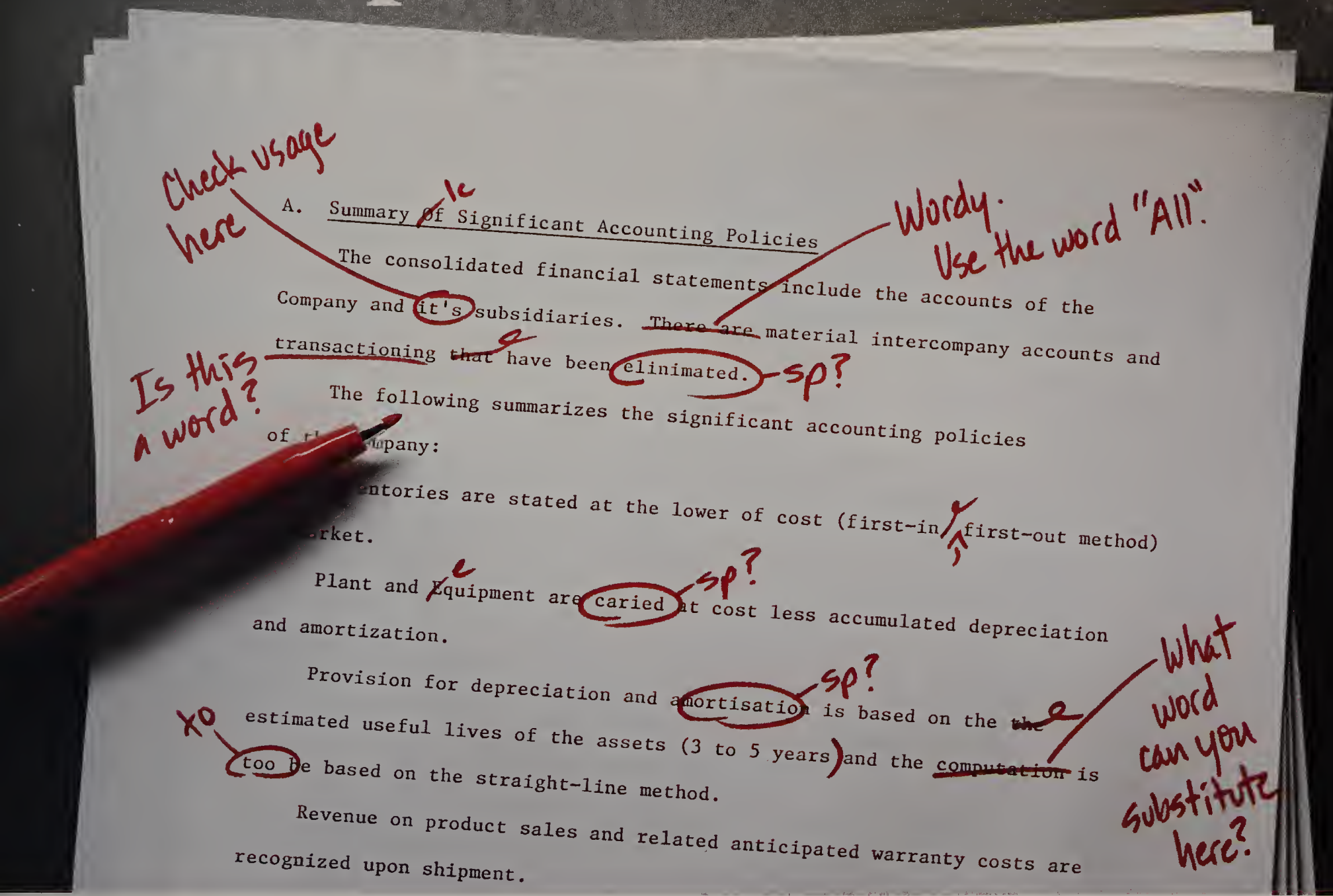

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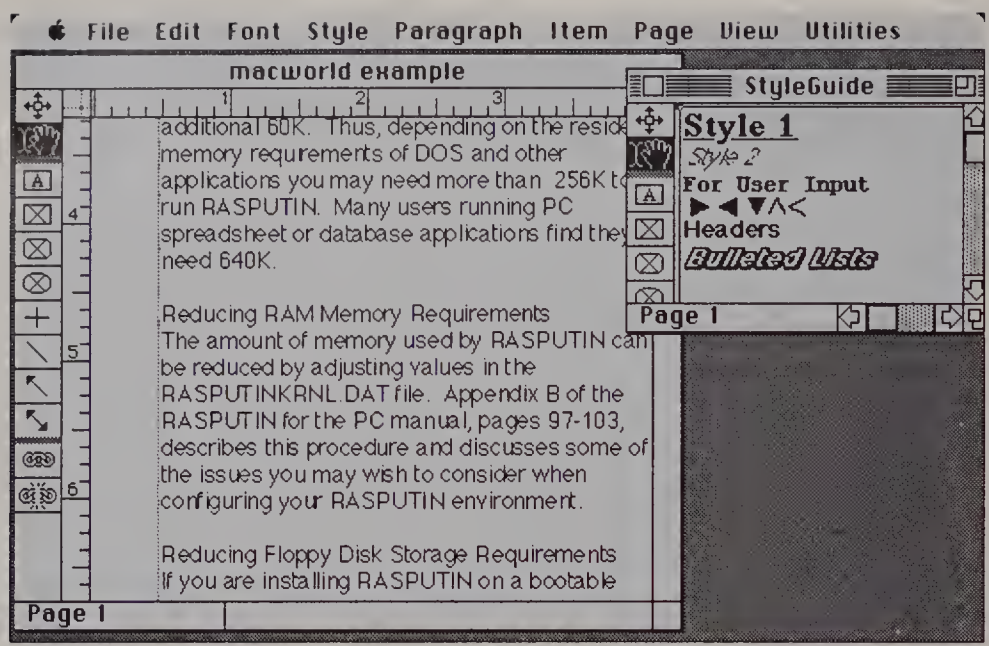

Making Style Guides
If you make your own style guide, you can copy paragraph and character formats from your own library of styles, without taking up a lot of room on the desktop.

For example, here's how you would enter a title in your document with a format we'll call *Style 1.* Copy a sample (even a single character will do) from Style 1 into your document as a new paragraph, and then start typing. (If you paste the Style 1 selection into an existing paragraph, it merely conforms to the existing format.) To change the format of type already entered in the document, use the Copy Format technique: click in the paragraph you want to alter, move the I-beam pointer to the desired format, and press Option-Shift-click.

To control the formats for entire pages, set up master pages as detailed in the *XPress* manual under "Designing and Using Default Pages," chapter 2, page 40.

Moving Graphics Blocks

Because *XPress* doesn't let you copy boxes between pages, you have to jump through a few hoops to move a picture from one page to another. Start by selecting the box with the graphic you want to move and press ⌘-M to display the box's specifications. Write down the specs. Go to the new page and create a graphics box of any size. Press ⌘-M again and type in the numbers you recorded to replicate the old box's size, location, and scaling. Finally, paste in the graphic itself.

Production

Even the best of all possible documents isn't complete until it has been printed. The following tips can help you avoid snafus on your way to the finished product, especially if you're using a high-end Linotronic 100 or Linotronic 300 to produce printing masters.

Color Separations

XPress was one of the first Mac programs to allow you to separate and print color overlays automatically. If you design a newsletter with green borders around black type, *XPress* can print the borders on one sheet and the type on another. The program can also add registration marks to each page to allow the printer to align the colors properly. But be careful. When the Registration Marks box in the print dialog box is checked, the image automatically shifts 3/4 inch down and to the right. On a page that is 8 by 10 inches or less, that isn't a problem. But if you're using a LaserWriter for standard 8½- by 11-inch pages, it means that any image within 1 inch of the right-hand or bottom edge of the page will not print. With Linotronic typesetting equipment, or other equipment with sheets larger than 8½ by 11 inches, turning on Registration Marks poses no problems.

Avoiding Improper Spacing

Sometimes, despite all your fine-tuning, the output from very high resolution printers (such as the Lintronic 100 and 300 typesetting machines) does not match what you see on the Macintosh screen. This can be a big headache because it usually turns up at the last possible moment. Here's one way to avoid unexpected line breaks and word spacing in Linotronic galleys: edit text only in *XPress*'s actual size, not in reduced or enlarged views. (This should not be a problem with the LaserWriter or the ImageWriter.)

Fonts for the Linotronic

Experienced desktop publishers have learned the hard way to stick with known fonts for Linotronic output. Some swear by Adobe's fonts for reliable accuracy in leading, kerning, and character-width values. They'll try an appealing font from another publisher only if they've heard from reliable sources that the typeface reproduces accurately on the Linotronic 100 and 300. Because the resolution is so much higher on these typesetters, slight inaccuracies in a font's character-width tables can cause an extra line wrap (not apparent on screen or in ImageWriter or LaserWriter proofs) that could disrupt an entire layout. When using unfamiliar fonts, always test them thoroughly on the Linotronic well ahead of your deadline. Be especially careful if you're using fonts with very thin strokes in the characters; they may virtually disappear in the Linotronic version.

Incompatible Fonts

More and more typesetting and copy shops are beginning to offer Linotronic services. However, just because an establishment can afford a $40,000 machine doesn't necessarily mean its employees know how to use it. This is particularly true with any but the most common fonts (such as Times and Helvetica). If you are using less popular PostScript fonts, here's an easy way to avoid hassling with people who may claim that they can't print your document because it contains weird fonts. Before embarking on your trip to the typesetter, create your own Mac boot disk complete with the System, the *XPress* program, all the screen fonts (installed with Font/DA Mover), and downloadable PostScript font files for each font in your document. Take this disk with you and boot up the typesetter's Mac with it. Then run Chooser (from the Apple menu) and select the correct output device. Finally, run *XPress,* open your document, and print it.

Gray Scales

Here's a hint about using the Shade feature for blocks and borders. The gray scales (darkness of shading) differ for each type of printer–LaserWriter, ImageWriter, Linotronic, and so on–because the dot size differs for each machine. Check a gray-scale sample printout from the printer you intend to use before you finish your design.

Saving Time

To cut printing time when you are doing lots of proofing, select Rough printing, which excludes pictures. □

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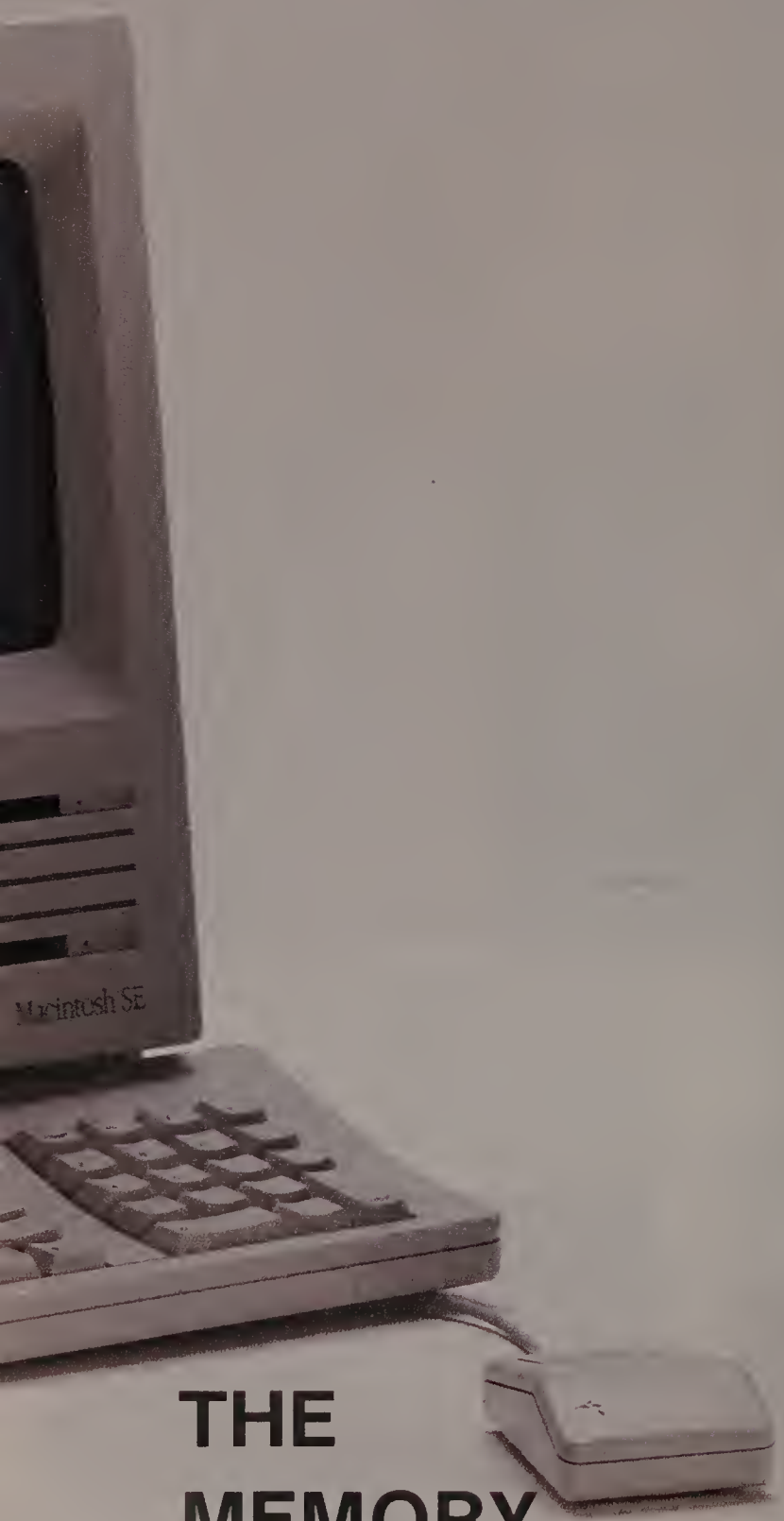

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Mac System Tools

A consumer's guide to fans for preventing Mac burnout

by Barbara J. Chan and Gordon Haig

Most personal computers have an internal fan. But the original Macintosh and Macintosh Plus do not, because they were designed to usurp little desk space and to be quiet.

So why does any Macintosh user need a fan? Computers operate on electricity, electricity generates heat, and heat deteriorates electronic components. Insulators dry out, crack, or crumble and semiconductor components age. The Mac has two circuit boards: an analog (or power) board, which drives both the computer and the video screen; and a system (or logic) board, which is the brain and memory bank. The analog board is the hottest part and is the most likely to fail through prolonged use. We've seen Macs go up in smoke because the flyback transformer overheated, blistered, and melted down inside, while the pin solder cracked and spread out across the board. Apple could have made the components more heat-resistant by making the conductors bigger and spacing them further apart–but then the Mac would have been bigger, slower, heavier, and more costly.

While researching this article we questioned independent technicians who disassemble and analyze failed boards. (We tried people at Apple, but no one would go on record.) According to Loy Spurlock, president of Computer Quick in La Mirada, California, between 60 and 75 percent of the Macs brought in for repair have problems with the analog board. Chuck Rusch of Eugene, Oregon, writes in *MacTutor* that 100 percent of the Macs two years old or older that he has examined had visibly cracked joints on the analog board. He says the damage results from the strain of repeated expansion and contraction on the solder. Computer Quick's records indicate that in the summer, when the average high temperature is 84 degrees, three times as many power boards fail as in winter, when the average high is 67 degrees. These service technicians maintain that at least some, and perhaps many, of these failures could be prevented by additional cooling.

Floppy disks also expand when heated. In fact, if heat builds up, the disk can expand enough to cause temporary misalignment–which may make the disk unreadable when cool. About 1 in 50 file-recovery problems handled by the Berkeley Macintosh User Group's help line result from this problem, according to Steve Costa, the group's file-recovery expert. The Apple manual says that the Mac requires an ambient temperature between 50 and 104 degrees Fahrenheit. But the temperature at your desk is not the only factor influencing the Mac's internal temperature. The convection cooling system–designed for a closed box–is compromised when people insert a board or internal hard disk. Those extras draw more power, generate more heat, and in some cases block the flow of cooling air on which the original design depended. (Even external devices such as hard disks may interfere with this crucial airflow if they are positioned too close to the air-intake vents at the bottom of the Mac.) Under these conditions, or in any situation where reliability is critical, additional cooling is essential to keeping the Macintosh system functional. Extra air circulated throughout the case can reduce the temperature inside by as much as 68 percent, thereby prolonging the life of the Macintosh.

Dancing the Fandango

Cooling systems offer a variety of extra features–such as a built-in surge suppressor or a special tool for installation and

(continues)

PHOTOGRAPHS BY FRED STIMSON

This table compares cooling system capabilities and features. The test Mac was a 512KE with the new ROM, a SCSI board, and a Mac Plus-type analog board. All temperatures are in degrees Fahrenheit; average room temperature was 75 degrees.

Cooling Tools

	Mac	System				
Analog board temperature (Fahrenheit)	130.2°	113.8°	107.4°	110.7°	92.8°	115.0°
Analog board reduction (Fahrenheit)	n/a	16.4°	22.8°	19.5°	37.4°	15.2°
System board temperature (Fahrenheit)	87.7°	80.2°	79.6°	80.2°	78.7°	83.3°
System board reduction (Fahrenheit)	n/a	7.5°	8.1°	7.5°	9.0°	4.4°
Control center	n/a	2 outlets, 1 unswitched	switch for Mac only	2 switched outlets	2 switched outlets	n/a
Built-in surge suppressor	no	yes	yes	yes	yes	n/a
Noise rating (0-5; 5 is noisiest)	0	4	5	2	3	0
Ease of installation	n/a	requires special tool	easy	easy	easy	requires manual dexterity
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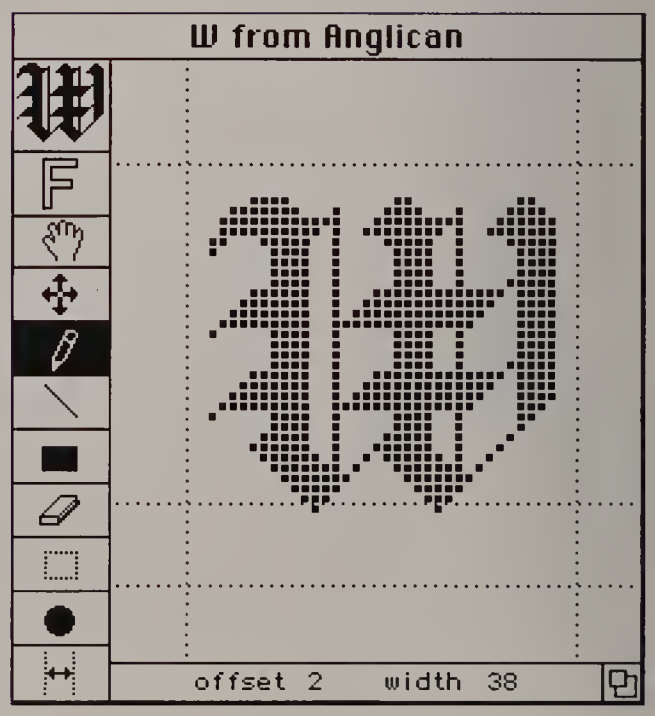

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Blowhard Industries MacFan

removal (see "Cooling Tools").

We tested five systems. The Fanny Mac and MacFan fit snugly into the Macintosh handle. The System Saver Mac protrudes 2 inches above the Macintosh handle. The Mac'N'Frost covers the entire top, including the vents. The fanless MacChimney convection device sits on top of the Macintosh like the Tin Man's hat.

The fans are all rotary or propeller types. (The MaxChill piezoelectric fan had been discontinued at press time.) The MacChimney uses no power; instead, warm air rises through the chimney, drawing fresh air through the Macintosh, much like someone sucking on a straw.

Beck-Tech Fanny Mac

Kensington Microware System Saver Mac

As with most Mac accessories, the cooling units come in several colors and

(continues)

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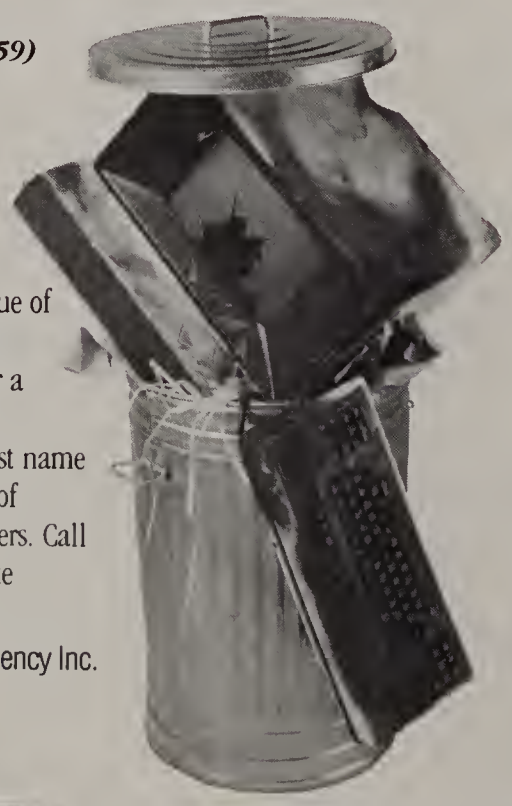

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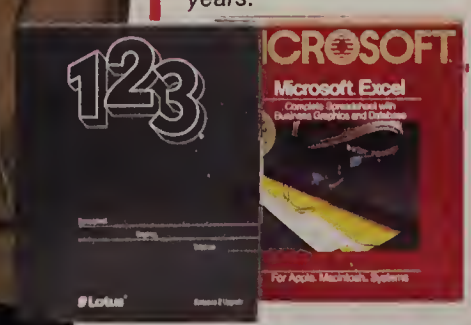

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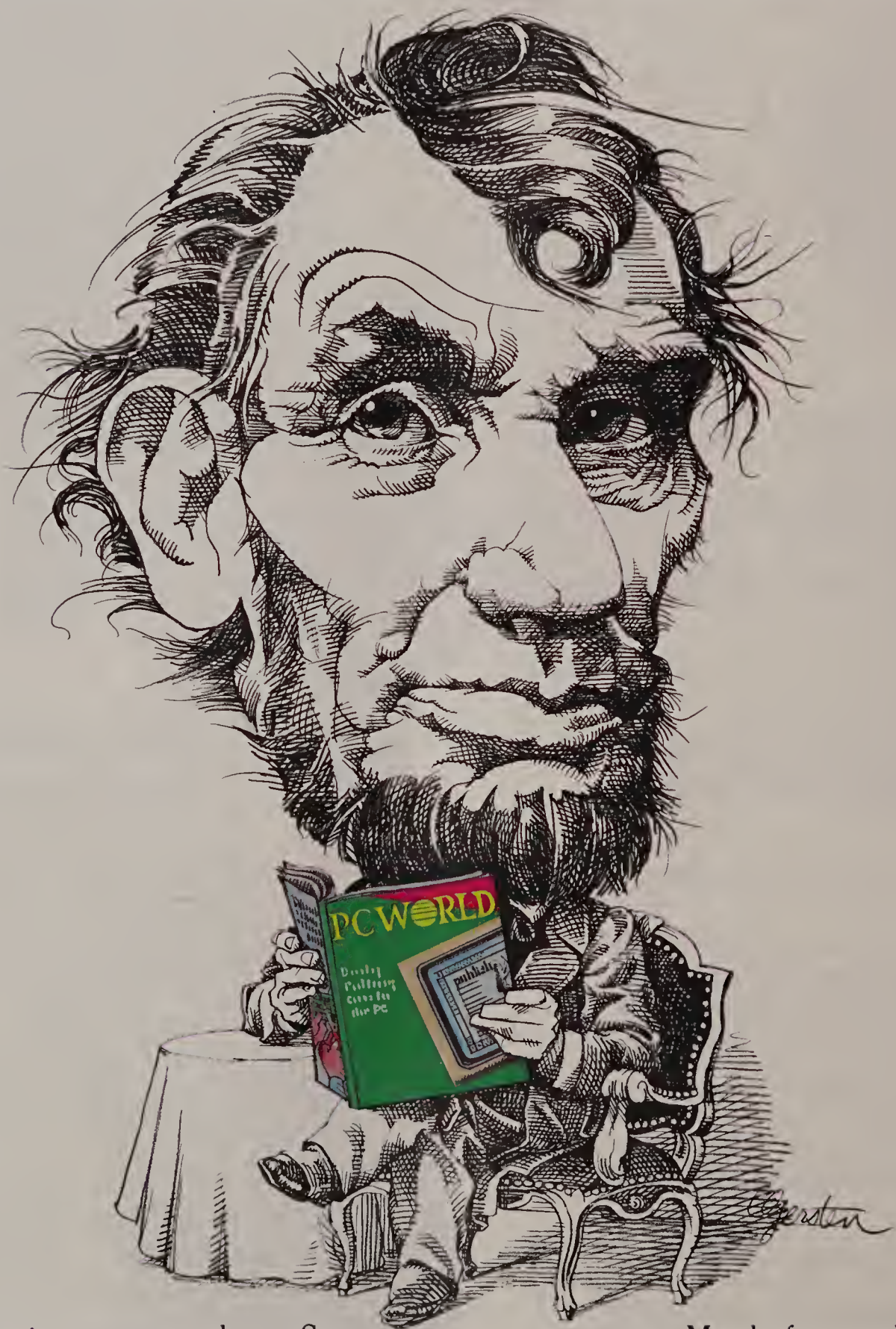

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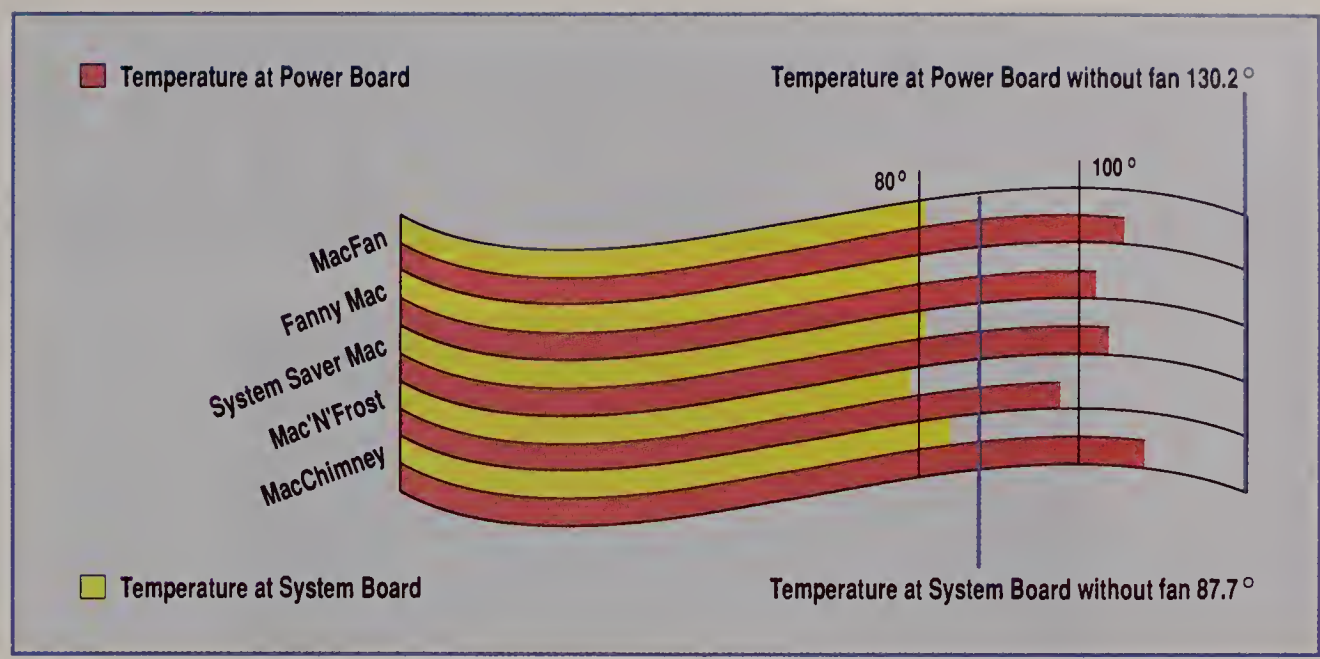

Cooling Compared
This bar chart shows how much each cooling device lowered the average temperature of a Mac's power (analog) and system boards. Without a fan, the Mac's power board averaged 130.2 degrees Fahrenheit, while room temperature averaged 75 degrees.

Silicon Comforts MacChimney

materials: beige steel or plastic, or glossy platinum cardboard.

Playing Fantan

We tested a 512K Macintosh, which was enhanced with the new ROM. The Mac we used has a SuperMac SCSI board installed on the system board and a newer Mac Plus-type analog board. To establish a point of comparison, we measured the temperature of this Macintosh without any additional cooling devices. We measured the inside temperature using two thermocouple probes; we put one above and in front of the flyback transformer at the top of the analog board and the other above the system board to the right of the 68000 chip. The average temperatures were 130.2 and 87.7 degrees Fahrenheit, respectively, with an average room temperature of 75 degrees.

We then tested the five cooling systems on this same Macintosh over a six-month period; the results appear in "Cooling Compared." The temperature at the analog board peaked at 55 degrees above room temperature and at 12.7 degrees above room temperature at the system board.

All five systems were effective; they managed to reduce the temperature at each location by an average of 22 degrees. The Mac'N'Frost was the most effective, though, reducing the analog-board tem-

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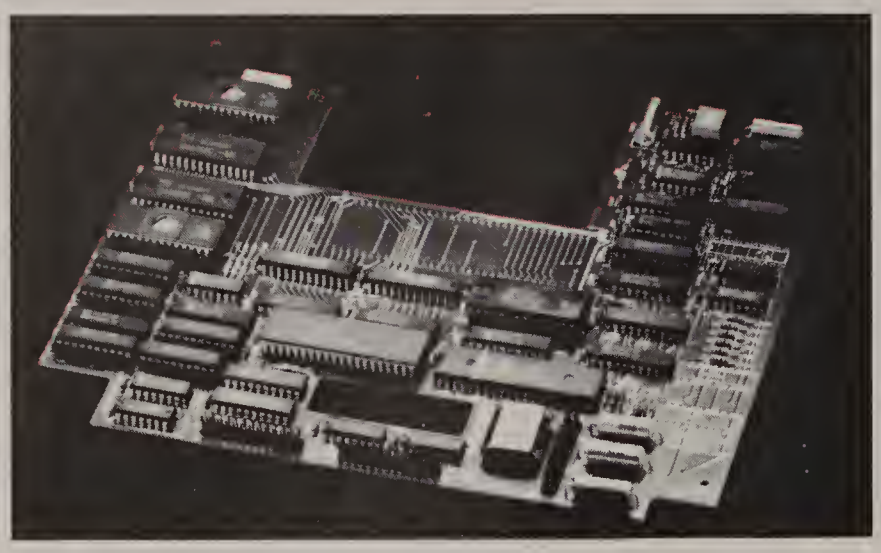

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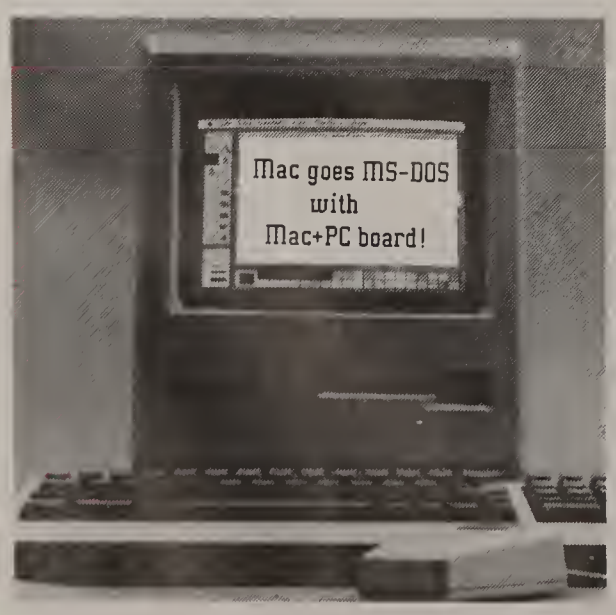

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perature by 37 degrees. In spite of its small fan, the Mac'N'Frost's large-surface design allows it to pull air from all of the top vents. The MacChimney, with its unconventional design, cools almost as effectively as the rotary fans.

In addition to cooling effectiveness, we also noted relative noise levels, comparing the fans to each other and to a DataFrame 20 hard disk, a MacBottom 20, and a LaserWriter Plus. Our noise ratings are based on our personal judgment rather than measurements. Of course, the unpowered MacChimney was the quietest. The System Saver Mac is the quietest rotary fan. The Mac'N'Frost is about as loud as a DataFrame 20; the MacFan is comparable to a LaserWriter; and the Fanny Mac is the noisiest of them all.

Some people worry that the extra air a fan pulls in will bring with it another undesirable side effect: dust. While dust is no better for Mac components than heat is, we think the cooling benefits outweigh a little extra dust. Besides, if your Mac must stay in an especially dusty location, you could always point a vacuum cleaner nozzle at the empty disk drive slot to clear out some of the buildup—while the Mac is turned off, of course.

Firing up a Macintosh with hard disk, modem, and printer almost requires a command center, but three of the fans allow you to streamline the process. The MacFan, Mac'N'Frost, and System Saver Mac each have two surge-protected outlets to which peripherals can be attached. The MacFan has a single switch on top that controls the fan, the Mac, and one of its outlets; the other outlet is always live. The Mac'N'Frost and System Saver Mac each have a second switch that independently controls the other outlet—so you can start your hard disk before you turn on the Mac, fan, modem, or printer.

Which One Is Fantastic?

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See *Where to Buy* for product details.

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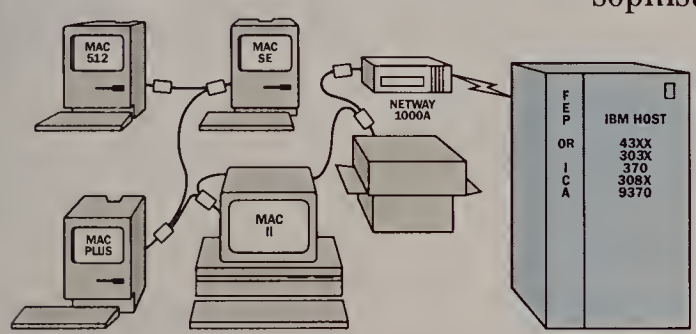

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Updates

Highlights of software updates recently received but not yet tested. The first price is the upgrade cost for registered owners; the second is the list price.

Family Roots version 1.2B prints charts, allows selective text styling, and supports hard disks. Quinsept, Inc., P.O. Box 216, Lexington, MA 02173, 617/641-2930. $22.50; $72.50 new.

Fluent Fonts version 2.0 includes 18 new typefaces and more sizes within families. Kerning pairs have been added to some fonts. CasadyWare, P.O. Box 223779, Carmel, CA 93922, 408/646-4660. Free to those who purchased after April 15, 1987; otherwise $12; $49.95 new.

Idealiner version 2.3 fixes problems with zoom windows. Lets you view section numbers, customize outline numbering, and preview outlines before printing. Also includes selective text styling. Jimmy Mac Software, P.O. Box 957, Murfreesboro, TN 37133, 615/895-6427. Free; $40 new.

MacInUse version 2.0 is compatible with *AppleShare, TOPS, MacServe,* and other network products. Design Form feature lets you customize screens for soliciting information. An F-key records information to the data file from within an application. Tracks application usage under *Switcher.* Softview, Inc., 4820 Adohr Ln., Ste. F, Camarillo, CA 93010, 805/388-2626.

Spellswell version 2.0A is compatible with *Word* 3.01 and Symmetry's *Acta.* Includes guess feature, expanded proofreading capabilities, transfer function, and improved user interface. Working Software, 321 Alvarado St., Ste. H, Monterey, CA 93940, 408/375-2828, 800/331-4321; 800/851-1986 in California. Free with disk and receipt if purchased after June 1, 1987; otherwise, $18.50; $74.95 new.

TimeMinder version 1.4 is compatible with *Switcher.* Allows you to halt time tracking for interruptions. Aatrix Software, 405 Bruce Ave., Grand Forks, ND 58201, 701/746-7202. Free; $139.95 new.

TOPS for the Macintosh version 3.18.87 includes a LaserWriter spooler and a data translation application. Centram, 2560 Ninth St. #220, Berkeley, CA 94710, 415/549-5900. Free if purchased after June 1, 1987; otherwise $29; $189 new.

World Builder version 1.1 is compatible with *Soundwave* from Impulse. Fixes a serious bug in previous version. Silicon Beach Software, 9580 Black Mountain Rd., Ste. E, P.O. Box 261430, San Diego, CA 92126, 619/695-6956. Free; $79.95 new. □

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Macworld Directory

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FORMAT: The standard format includes a product ID, a 300-character descriptive ad, and a company name, address, and telephone number.

Advertisers may choose among categories already in use, or they may create their own. Display advertisers can cross-reference their current ad to the Macworld Directory for increased exposure.

RATES: Listings are accepted for a three-time consecutive insertion at a rate of $850. We offer a six-time insertion at $1450 that reflects a 15% frequency discount. Listings must be prepaid (except for established display advertisers) upon submission of ad copy. Checks, money orders, Visa, and MasterCard are accepted.

DEADLINE: For copy deadlines and further information please contact Niki Stranz, your Macworld Directory Account Manager, at 415/546-7722 or 800/435-7766 (800/435-7760 in California). Please send copy and prepayment to the Macworld Directory, 501 Second St., San Francisco, CA 94107.

■ *Accessories*

○ *Bags*

Cordura Bag for Mac SE

- Organize Mac components for easy access, w/padded interior compartments.
- Tough Cordura® & resilient foam padding for protection.
- Quality material & carefully crafted construction–guaranteed.
- Ask about our ImageWriter II case.
- Call your local dealer today! For the dealer nearest you, call us or write. Dealer inquiries invited.

West Ridge Designs, 305 N.W. 12th Ave., Portland, OR 97209, 503/248-0053

○ *Cables*

Mac Lock/Mac Cables

Mac Lock, finest security kit for Mac/+, secures Mac, keyboard, mouse, 2nd drive, modem, & printer. Attractive red vinyl-covered steel 3/16" cables. Lock included. No tools req. $-back guarantee. Also, IBM, Apple, etc. $40. Mac Cables provide any length custom cables for Mac/+ (incl. keyboard) or almost any computer need. $20 & up.
Mac Products, 20231 San Gabriel Valley Dr., Walnut, CA 91789, 714/595-4838

○ *Hardware*

MACOPENER™

The finest one-piece tool to open the Macintosh case. Do your own upgrades, installations, adjustments, and repairs. No moving parts. One year warranty, parts and workmanship. Suggested list $19.95 + $3 shipping and handling. Dealer inquiries welcome.
Central Products Corp., 2211 Norfolk #518, Houston, TX 77098, 713/529-1080

Keypad/Trackball

The Numeric Ease: Upgrade your 512K/128K w/a 22 station, full scale, full function numeric keypad. Includes cursor keys & direct function keys, such as +, −, ×, ÷, & =. List: $59. The Numeric Turbo: A track ball cursor controller combined w/numeric Ease. List: $169. Dealer inquiries welcome.
Cambridge Automation, Inc., 20230 State Rd., Cerritos, CA 90701, Orders/Info: 800/345-8666 or 800/826-9214 in CA.

○ *Mouse*

RealClean™/MouseEase™

New! *RealClean* mouse cleaning kit gets grime off internal rollers. Special tool advances and scrubs rollers. Includes tweezers & cleaning solution. $14.95 + $2 s/h. For all Apple mice. From the makers of *MouseEase*, teflon paws for 512K/Plus Apple mice. $2.95 + .50 s/h. CA res. add sales tax. Send check to:
Tacklind Design, 250 Cowper St., Palo Alto, CA 94301, 415/322-2257

○ *Supplies*

LaserWriter Toner Recharge

Don't throw out empty toner cartridges. Sell them to us. Cartridge $6.50, cleaner $3, & box + packing $.50. • PRINTERS: Apple LaserWriter, HP & more • COPIERS: Canon PC models • BUY OUR RECHARGED CARTRIDGES $50, Blu/Brn $70. We supply empty cartridge & felt cleaner. QC test sheet provided. Support available.
Michlin Computer Consultants, Inc., Laser Cartridge Division, 3770 Plaza Dr. #1, Ann Arbor, MI 48108, 313/663-9800

Laser Cartridge Recharge!

$$$Save a lot of money recharging laser-printer toner cartridges for Hewlett-Packard LaserJets, Canon, Apple LaserWriter, Corona, QMS. Recharged cartridges are reconditioned to work like new but last 20% longer. Money-back guarantee. Send $40 per cartridge plus $3 s/h. Monthly discounts.
Toner Technologies/Laser Systems, 7 North Main, P.O. Box 407, Kaysville, UT 84037, 801/544-3090

Diskettes/Fire Protection

Sony 3½" diskettes: single- sided $1.53 each, double-sided $1.93. Unbranded, unboxed, unlabeled. Any quantity, no minimum order. Labels 7¢ ea. Halon fire extinguisher–small desktop size (18 oz.), class 1B:C, won't harm computer equipment, $21.95. Visa/MC/check/MO. Add 2 s/h.
Casablanca Software, P.O. Box 214, Dept. AA, Hicksville, OH 43526, 419/542-8145

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Hot New Field!! Join our network & make money now. Train at our location. High profit, low overhead. Established company (over 500 retail accounts). Learn it right–no drill & fill! Factory- like recharge method, LONG LIFE'S for only $59. Receive tools, supplies, trade secrets, marketing strategy & technical support. Free call for information.
Laser Charge Co., 11782 Jollyville Rd., Austin, TX 78759, 800/223-8134 or in TX call collect 512/335-8191

■ *Advertising*

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*72+ price. $3.60 for 144 mugs. Quantity pricing available for larger orders. FREE catalog!
Computer Expressions, 3833 Chestnut St., Philadelphia, PA 19104, 215/222-4400

○ *Mailing Lists*

Macintosh Mailing Lists

Macintosh user names & addresses on adhesive labels or as Mac files on diskettes. Over 120,000 names to choose from. Only 5¢ per name for one-time rental. No charge for selecting, sorting, key coding, media, or delivery. Choose any quantity. This extremely high-quality list is updated daily. Ask for our one-time rental agreement before sending payment.
Semaphore Corp. 207 Granada Dr., Aptos, CA 95003, 408/688-9200

■ *Consulting*

Custom Developer

Specializing in integrated systems for legal, medical, sales & corporate mgmt. communities. Macros, templates, custom applications developed using *Omnis 3+*,™ Document Modeler,™ Project Modeler,™ Red Ryder,™ Excel,™ & Tempo.™ Nationwide service through our 24 hr. BBS. Fixed price, T&E, or hourly contract negotiable.
Phoenix Support Systems, 3232 San Mateo NE #199, Albuquerque, NM 87110, 505/765-9666

○ *Computer Insurance*

Safeware

Insure your computer. Safeware provides full replacement of hardware, media, and purchased software. As little as $39 a year provides comprehensive coverage. With our blanket coverage, no lists of equipment are needed. One phone call does it all! Call 8 a.m. to 10 p.m. EST (Sat. 9 to 5).
Safeware, The Insurance Agency Inc., 2929 N. High St., P.O. Box 02211, Columbus, OH 43202, 800/848-3469 (national), 614/262-0559 in Ohio

■ *Hardware*

○ *Bar Code*

Bar Code/Mag Card Readers

Bar code & mag stripe (credit card) readers for all Macintosh computers, easily connected on the keyboard circuit, requiring no additional program or port; simple but powerful code-39 bar-code printing program for ImageWriter & LaserWriter; magnetic encoder/verifier. GSA pricing avail.
TPS Electronics, 4047 Transport St., Palo Alto, CA 94303, 415/856-6833

○ *Hard Disk/SCSI*

YOUR MAC SOURCE

Dataframe 30, 60MB SCSI hard disk drive. For all your Mac needs from hard disk drives, software, peripherals, Mac cases, books, networking and consulting. Desktop publishing typesetting and graphic design. Manuals, catalogs, newsletters, & brochures. Call us today!
Your Mac Source, 5600 Roswell Prodo North, #264, Atlanta, GA 30342,404/843-2267, 800/367-7552

○ *Lisa/Mac XL*

MACsimize your Lisa/XL

Dafax provides full service & support for your Lisa/Mac XL. We carry a full line of upgrades, replacement parts & peripherals, including HFS, 20MB replacement hard disks for *all Lisas & XLs,* RAM upgrades & more. For latest new product information call our toll-free hotline 800/782-7823.
Dafax Processing Corp., 14 North Drive, Malba, NY 11357, 800/323-1751 (orders & info.), 215/574-0357 (PA)

○ *Memory Upgrade*

Memory Enhancements

Upgrade your Mac to 512K, 1024K, or 2048K of contiguous memory. SCSI port & fans available. Factory flow-solder techniques used for high reliability. 120-day warranty. Local 20-minute installation or mail order. Dealer inquiries welcome. Call for pricing and information.
Ehman Engineering, 115 Apache Dr., Evanston, WY 82930, 800/257-1666

SIMM MODULES

- Bring your PLUS, SE & Mac II up to max memory. These SIMMS utilize surface mt. technology as chosen by Apple.
- Specs: 1M DRAMS are 120NS, CMOS components selected for cooler operation & greater reliability.
- Also available 256K SIMMS & video RAM upgrades.
- All products unconditionally guaranteed.
- All inquiries welcome

CDC Enterprise, 2883 E. LaPalma, Anaheim, CA 92806, 714/630-4633

ONE MEGABYTE SIMMS

Upgrade your Mac Plus, Mac SE, or Mac II by 2 Megabytes for $575. These SIMM modules are the newest state-of-the-art plug-ins for Macs isted above. Low power eliminates the need for cooling devices. Using surface-mount technology these units should fit most future models for many years. We offer a limited lifetime guarantee against mfg. defects. (Dealers welcome.) Visa/MC accepted.
D.M.S. (Data Memory Systems), Box 785, Middleton, MA 01949, 617/683-2325

○ *Networking*

PhoneNET System

The PhoneNET system creates an AppleTalk network with the convenience, added distance, & flexibility of telephone wire. PhoneNET supports AppleTalk & can use standard telephone cabling, even existing wiring. Components include: PhoneNET PLUS Connector, the PhoneNET StarController, the TrafficWatch network analysis pkg. & the PhoneNET CheckNET desk accessory. Call for the dealer nearest you.
Farallon Computing, 2150 Kittredge St., Berkeley, CA 94704, 415/849-2331

CompuNet Connector

LOW COST-HIGH QUALITY
AppleTalk PhoneNet™ compatible network connector. Uses standard telephone wire. No special hardware required for 3000 ft. AppleTalk networks. $24.95 retail. SCSI Cables 25-50 & 50-50 UL. $24.95 retail. Dealer inquiries welcome.
Trimar USA Inc., 236 W. 15th St., New York, NY 10011, 800/872-4454, 212/645-7008

Ethernet for the Mac

Kinetics provides Ethernet hardware and software for all Macintosh computers. These product include:
- FastPath: An AppleTalk-Ethernet gateway
- EtherSC: A SCSI-Ethernet controller
- EtherPort SE: An internal Ethernet option card for the Macintosh SE

AppleTalk and TCP/IP software is supported.
Kinetics, Inc., 2500 Camino Diablo #10, Walnut Creek, CA 94596, 415/947-0998

○ *Peripherals*

Sunol Systems Hard Drives

- Sunol offers mass storage ranging from 21 to 245MB.
- SUN*TALK (disk server) increases productivity by sharing files and programs for Mac, Apple II, IIgs, IBM and other computers.
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- High capacity SCSI drives available.
- Prices range from $1095 up.

Sunol Systems, Inc., 1177 Quarry Ln., Pleasanton, CA 94566, 415/484-3322

○ *Printer Interfaces*

Grappler C/Mac/GS

This Universal Parallel Printer Interface makes most popular laser and dot matrix printers perform flawlessly with the Mac Plus, SE and II. The Grappler's built-in intelligence allows the printer to emulate Apple's own ImageWriter II, eliminating unreliable drivers and erratic page sizes. Just plug it in and print. It's that easy! Suggested retail: $99.
Orange Micro, Inc., 1400 N. Lakeview Ave., Anaheim, CA 92807 Order: 800/223-8029, in CA 714/779-2772

○ Video

MacMonitors/Projectors

• Does your Mac need to be seen in the boardroom, classroom, trade show midway? Big-screen (17" to 23"), high res color or monochrome w/anti-glare & vari scan, from $1,095. • Projector systems for the ultimate in Mac-impact,from $3,895. • Rental MacMonitors & projectors avail. • Dealer inquiries. *National Television Systems Co, 2113 Wells Branch Parkway, Suite 6100, Austin, TX 78728, 512/251-1392, 800/777-3000*

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From *any* Mac (512K, Plus, SE, II)
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Comtrex, Ltd., P.O. Box 1450, El Toro, CA 92630, free newsletter 800/443-2751 x145, technical questions 714/855-6600

■ Insurance

Data Security Insurance

The "all risk" Personal Computer Policy from DSI includes essential coverage not available with other policies: protection against loss of data (even from accidental erasure), loss of custom programs, & fraud. As low as $35 a year. Coverage can be bound by telephone, 9 to 4 Mountain Time.
Data Security Insurance, 4800 Riverbend Rd., P.O. Box 9003, Boulder, CO 80301, 303/442-0900, 800/822-0901

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■ Services

○ Data Conversion

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CompuData Translators, Inc., 3325 Wilshire Blvd., #1202, Los Angeles, CA, 213/462-6222, 800/825-8251

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Conversion services for your Macintosh, to or from over 800 computer systems:
• Mag tapes
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• Typesetters
Our conversion capabilities include to or from 3½-inch, 5¼-inch, and 8-inch disks & mag tapes.
Pivar Computing Services, Inc., 165 Arlington Heights Rd., Dept MC, Buffalo Grove, IL 60089, 312/459-6010

○ Desktop Publishing

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MacTypeNet,™ P.O. Box 52188, Livonia, MI 48152-0188, 313/477-2733

Laser Printing Services

LaserWriter (300-dpi)/Linotype L100 (1270-dpi) output of your Mac/IBM files. Disk or modem. 24 hr. service. Linotype $5 per page ($3.50 volume discount). LaserWriter $.50 per pg. Desktop publishing specialists in consulting & design services. Hardware/software sales. Xerox Ventura Publisher for sale at low price. Full offset printing & bindery services avail.
Laser Printing Services, 26058 W. 12-Mile Rd., Southfield, MI 48034, 313/356-1004 (MI), 800/722-3475 (nat'l) Modem: 313/356-3186

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Professional-quality file output service at competitive prices. Mac or IBM, via disk or modem to our LaserWriter or Linotype. Same-day service. We can also keyboard your copy, from a letterhead to a full-length novel. Also available: complete darkroom services and platemaking for your printer. Write or call toll free:
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TECHDOC, 23990 Schulties Rd., Los Gatos, CA 95030, 408/353-2663

○ Graphics

NYC/NJ/Phil./DE Designers

Desktop publishing doesn't have to look cheap! IBM or Mac files, disk or 24-hr. modem, for high-resolution L300 output through award-winning color printing, binding, & mailing. Impartial system advice, in-depth training, & support for major DTP pkgs. + PostScript itself. Messenger service! Ask for K. Downs.
Waldman Graphics, 9100 Pennsauken Hwy., Pennsauken, NJ 08110, 212/925-2420, 215/627-7200, 201/522-8778, 609/662-9111

West Coast Connection!

Upload by disk or 24-hr. modem for 2540-line L300 output, with up to 30 font calls per page. Support all Adobe fonts, Mac & PC software including Ventura, Pagemaker, and most PC word processors. 24-hr. turnaround. Adobe type dealer; beginning and advanced training for Mac, L300 and PC users. Convention service.
Lazer Graphix, 314 Las Vegas Blvd., Las Vegas, NV 89101, 800/492-0020, 702/386-2626 (Voice), 702/384-6761 (Fax). (24 hr. modem on line)

○ On-Line Info Service

Telefolders

Telefolders is a national electronic information service for Mac users only. Our software lets your Mac & any-speed modem access out public data base using only standard icons, windows, & pull-down menus. Browse, upload and download, with just a click of the mouse. No commands to learn, no typing to do. Over one-year old. $49.95 gets you a complete starter kit, access time included.
Semaphore Corp., 207 Granada Dr., Aptos, CA 95003, 408/688-9200

○ Typesetting

Command Typographer®

MAC TYPOGRAPHY. Macintosh/*Quality* Typesetting. *Command Typographer®* features were on minis & mains. *Sophisticated* multipass H&J provides kerning, formats, tabs, vertical justification, micro justification, automatic leader, letter spacing. $495. Save $, copy disk/modem, high-res. typesetting/24 hrs. Typesetting avail.
Regional Typographers/The Software Shop, 229 Bedford Ave., Bellmore, New York 11710, 516/785-4422

■ Software

○ Accounting

Payroll-General Ledger

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CheckMark Software, Inc., P.O. Box 860, Fort Collins, CO 80522, 800/426-2466 ext. 338

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Software Products Division, 22612 South Avalon Blvd., Carson, CA 90745-4190, 213/835-6077

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Niles & Associates, 2200 Powell St., 765M, Emeryville, CA 94608, 415/655-6666

○ *Apple Emulator*

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2.5RUN Apple II software on a Mac and still use desk accessories & Cut & Paste to Clipboard. Transfer Apple II disks to the Mac by cable or phone. Use UniDisk directly w/Mac drives. CONVERT *Appleworks* or any other Apple II data file into standard Mac textfiles. DEVELOP software using Apple II BASIC & ML. Full 65C02 debugging system built in.
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Human Intellect Systems, 1670 S. Amphlett Blvd., San Mateo, CA 94402, 415/571-5939

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Time Cycles Research, 27 Dimmock Rd., Waterford, CT, 06385, 203/444-6641

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TeleRobotics™ International, Inc., 8410 Oak Ridge Hwy., Knoxville, TN 37931, 615/690-5600

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Personal Computer Peripherals Corp., 6204 Benjamin Rd., Tampa, FL 33634, 813/884-3092, 800/622-2888

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Aatrix Software,™ P.O. Box 217 A, Grand Forks, ND 58206, 701/746-7202

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Infoplan, Inc., 155 Forest Ave., Palo Alto, CA 94301, 415/325-3190

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Artware Systems Inc., 3741 Benson Dr., Raleigh, NC 27609, 919/872-6511, 800/426-3858

○ *Communications*

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Tymlabs Corp., 211 E. Seventh St., Austin, TX 78701, 512/478-0611, Telex 755820

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Pacer Software, Inc., 7911 Herschel Ave., #402, La Jolla, CA 92037, 619/454-0565

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Mesa Graphics, P.O. Box 600, Los Alamos, NM 87544, 505/672-1998

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Avenue Software, Inc., 1173 W. Charest Blvd., Quebec, QC, Canada G1N 2C9, 418/682-3088

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MacPacq

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Biopac Systems, 42 Aero Camino #215, Goleta, CA 93117, 805/968-8880

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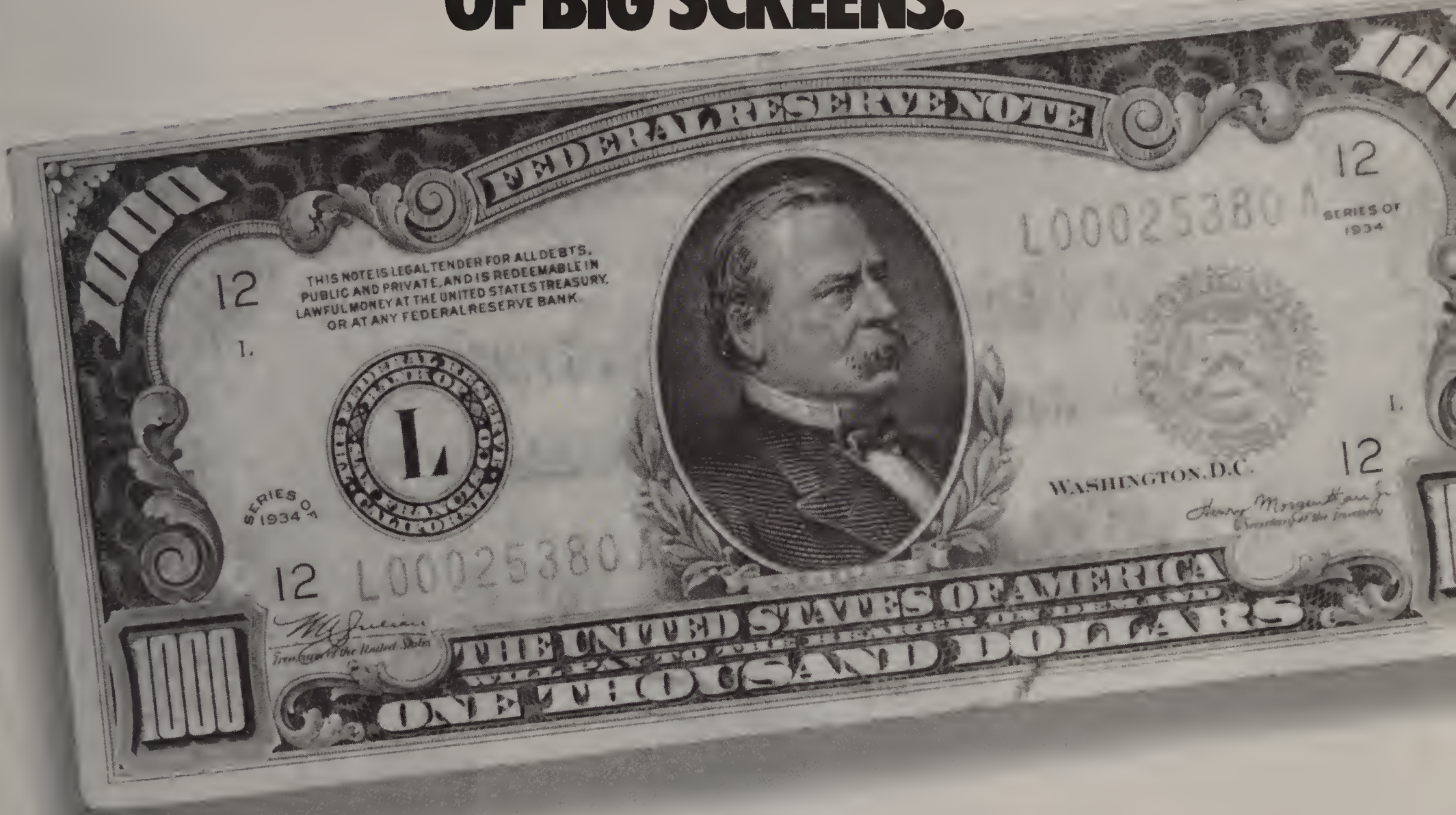

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Public domain software and shareware are available through online information services; user groups (call 800/538-9696 ext. 500 for information on a local user group); or mail-order clearinghouses such as Educomp, 742 Genevieve, Ste. D, Solana Beach, CA 92075, 619/259-0255, 800/843-9497, 800/654-5181 in California, or The Public Domain Exchange, 2074C Walsh Ave., Dept. 609, Santa Clara, CA 95050, 408/496-0624, 800/331-8125.

Pages 114 to 121
Benchmark: Mechanical CAD

Computer Aided Design Report
CAD/CAM Publishing, Inc., 841 Turquoise St., Ste. D, San Diego, CA 92109-1159, 619/488-0533. Single copy $11.50; annual subscription $138.

Dimensions
Version 1.18. Visual Information, Inc., 16309 Double Grove, La Puente, CA 91744, 818/918-8834. 1MB minimum memory; requires external drive. Design Dimensions: Mac Plus and Mac SE version $750, Mac II version $1395. Solid Dimensions: Mac Plus and Mac SE version $395, Mac II version $1295.

EZ-Draft
Version 2.0. Bridgeport Machines, Inc., 500 Lindley St., Bridgeport, CT 06606, 203/367-3651, 800/242-2404. Key-disk copy protection. 1MB minimum memory; requires external drive; hard disk recommended. $2495.

MacDesigner
Version 2.0D. Case, Inc., The Market Place, Manlius, NY 13104, 315/682-4000. Key-disk copy protection; installs on hard disks. 1MB minimum memory; requires hard disk. $2000.

MGMStation CAD
Version 2.09. Micro CAD/CAM, 3230 Overland Ave. #105, Los Angeles, CA 90034, 818/376-6860. Key-disk copy protection; installs on hard disks. 512K minimum memory; requires 800K of drive storage. $795.

MiniCad
Version 3.06. Diehl Graphsoft, Inc., 8370 Court Ave. #202, Ellicott City, MD 21043, 301/461-9488. Key-disk copy protection. 512K minimum memory; requires 800K of drive storage; Mac Plus and hard disk recommended. $495.

VersaCAD/Macintosh Edition
Version 1.0. Versacad Corp., 7372 Prince Dr., Huntington Beach, CA 92647, 714/847-9960. 1MB minimum memory; floating-point math coprocessor; hard disk and plotter recommended. $1995.

Pages 122 to 125
Excel Macro Treasury

Complete Book of Excel Macros
Osborne McGraw-Hill, 2600 Tenth St., Berkeley, CA 94710, 800/227-0900, 800/772-2531. $16.95.

Excel Macros Library
Que Corp., 7999 Knue Rd., Indianapolis, IN 46250, 317/842-7162, 800/428-5331. $19.95; with companion disk $39.95.

Microsoft Excel
Version 1.04. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; external drive recommended. $395.

Microsoft Excel with Macros
Microsoft Press, 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/638-3030 (orders only). $21.95.

Pages 126 to 135
Beyond Black and White

Adobe Illustrator
Version 1.11. Adobe Systems, Inc., 1870 Embarcadero Rd., Palo Alto, CA 94303, 415/852-0271, 800/292-3623, 800/852-3623 in California. Key-disk copy protection. 1MB minimum memory; scanner recommended. $495.

Adobe Separator
Adobe Systems, Inc., 1870 Embarcadero Rd., Palo Alto, CA 94303, 415/852-0271, 800/292-3623, 800/852-3623 in California. Product specifications to be announced.

Cricket Draw
Version 1.2. Cricket Software, Inc., 30 Valley Stream Pkwy., Malvern, PA 19355, 215/251-9890, 800/345-8112. 512KE minimum memory; external drive and LaserWriter recommended. $295.

LaserPaint
Version 1.1. LaserWare, Inc., P.O. Box 668, San Rafael, CA 94915, 415/453-9500, 800/367-6898. Key-disk copy protection. 1MB minimum memory; external drive or hard disk recommended. $495.

Quark XPress
Version 1.04. Quark Inc., 300 S. Jackson #100, Denver, CO 80209, 303/934-2211. Permits three copies; 512KE minimum memory; requires external drive or hard disk; Mac Plus recommended. $695.

Page 148
Four of a Kind

Direct Drive 50
Jasmine Technologies, Inc., 555 De Haro St., San Francisco, CA 94107, 415/621-4339. 512KE minimum memory; requires SCSI port for 512KE. $1159 cash, $1193 with Visa/MasterCard.*

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MacBottom HD45
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Rodime 45 Plus
Rodime Inc., Peripheral Systems Div., 29525 Chagrin Blvd., Pepper Pike, OH 44122, 216/765-8414. 512KE minimum memory; requires SCSI port for 512KE. $1595.*

Page 150
Gateway to the Future

Netway N1000A
Version 4.0. Tri-Data, 505 E. Middlefield Rd., Mountain View, CA 94043, 415/969-3700, 800/874-3282. 512K minimum memory; requires AppleTalk; Mac Plus recommended. $3195.*

Page 151
High Performance

Consulair MacC/MacC Toolkit
Version 5.0. Consulair Corp., 140 Campo Dr., Portola Valley, CA 94025, 415/851-3272. 512K minimum memory. $425.

HyperCharger 020
General Computer Corp., 215 First St., Cambridge, MA 02142, 617/492-5500. 1MB minimum memory; requires Mac SE. $1499, optional 68881 floating-point math coprocessor $1699.

Orion SE
MacPeak Systems, 1201 Spyglass, Austin, TX 78746, 512/327-3211, 800/225-7509. 1MB minimum memory; requires Mac SE. 1MB version $1495, 2MB version $1795, 4MB version $2695, optional 68881 floating-point math coprocessor $295.

Prodigy SE
Levco, 6160 Lusk Blvd. #C-203, San Diego, CA 92121, 619/457-2011. 1MB minimum memory; requires Mac SE. 1MB version $1495, 2MB version $1995, 4MB version $2795, optional 68881 floating-point math coprocessor $295.

Radius Accelerator
Radius, Inc., 404 E. Plumeria Dr., San Jose, CA 95134, 408/434-1010. 1MB minimum memory; requires Mac SE. $995, optional 68881 floating-point math coprocessor $395.*

Radius Full Page Display
Radius, Inc., 404 E. Plumeria Dr., San Jose, CA 95134, 408/434-1010. 512KE minimum memory. $1995.

Page 152
Money Worries?

MacMoney
Version 2.1. Survivor Software Ltd., 11222 La Cienega Blvd. #450, Inglewood, CA 90304, 213/410-9527. 512K minimum memory; external drive for 512K recommended. $98.95.*

Page 154
Four-Wall Challenge

MacRacquetball
Version 1.0. Practical Computer Applications, Inc., 1305 Jefferson Hwy., Champlin, MN 55316, 612/427-4789. Key-disk copy protection. 1MB minimum memory. $59.95.*

Page 155
Solid State

SemperSoft Modula-2
Version 1.0. Semper Software, P.O. Box 225, Glen Ellyn, IL 60138, 312/790-1253. 512K minimum memory; requires external drive. $195.

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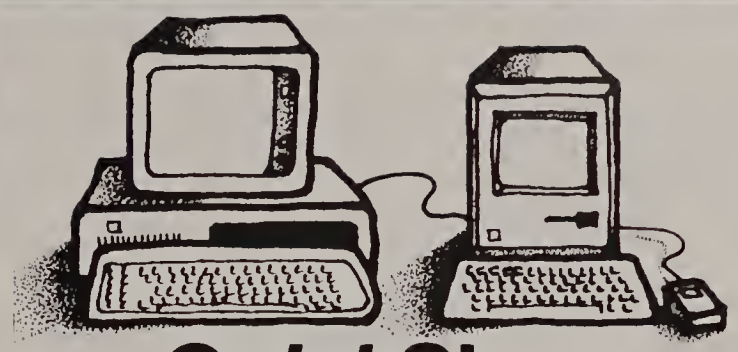

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TML Modula-2
Version 1.0. TML Systems, Inc., 4241 Baymeadows Rd., Jacksonville, FL 32217, 904/636-8592. 512K minimum memory; requires MPW and 800K of drive storage; Mac Plus with hard disk recommended. $99.95.

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Works Writing Enhancer

Microsoft Works
Version 1.1. Microsoft Corp., 16011 N.E. 36th Way, Box 97017, Redmond, WA 98073-9717, 206/882-8080, 800/426-9400. 512K minimum memory; external drive recommended. $295.

WorksPlus Spell
Version 1.0A1. Lundeen & Associates, P.O. Box 30083, Oakland, CA 94604, 800/233-6851, 800/922-7587 in California. 512K minimum memory; requires *Microsoft Works;* Mac Plus recommended. $59.95.*

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Behind the Scenes

CineWrite
Version 1.2b. Max3, Inc., 279 S. Beverly Dr. #1079, Beverly Hills, CA 90212, 213/276-7682. Key-disk copy protection. 512KE minimum memory; external drive recommended. $495.*

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Version 1.25. American Intelliware Corp., P.O. Box 6980, Torrance, CA 90504, 213/533-4040, 800/222-7638. Key-disk copy protection; installs on hard disks. 512K minimum memory; 800K of drive storage recommended. $495.*

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Impulse Audio Digitizer
Impulse Inc., 6870 Shingle Creek Pkwy., Minneapolis, MN 55430, 612/566-0221, 800/328-0184. 512K minimum memory. $199.95.

MacRecorder II Plus
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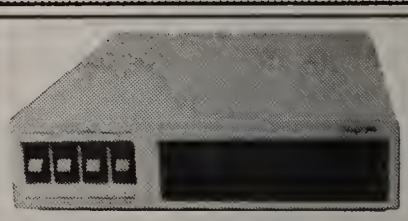

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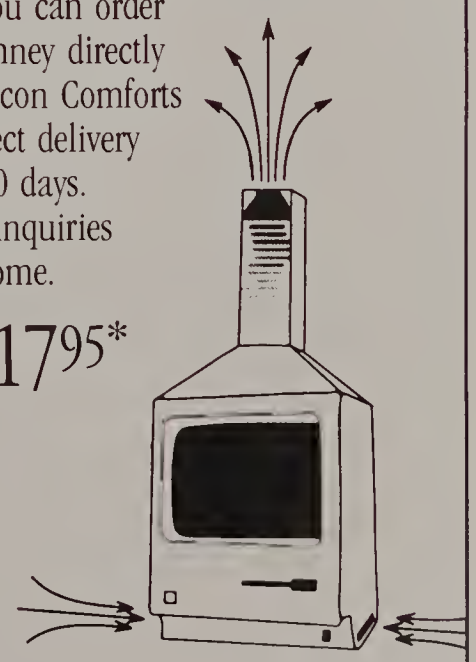

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MacRobots
Unicorn Software Co., 2950 E. Flamingo Rd., Greenview Plaza, Ste. B, Las Vegas, NV 89121, 702/737-8862. Key-disk copy protection. 128K minimum memory. $49.95.*

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Infocom, 125 Cambridge Park Dr., Cambridge, MA 02140, 800/262-6868. 512K minimum memory. $39.95.*

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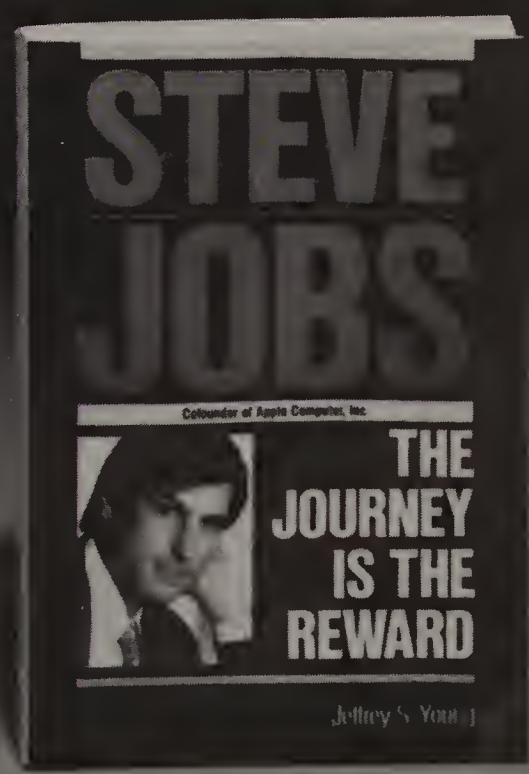

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1. Your primary job function:
a. Corporate or general manager
b. Department manager
c. MIS or micro manager
d. Engineering or scientific
e. Professional
f. Reseller/VAR
g. Self-employed
h. Other

2. Number of employees in your company:
1. 25 or fewer
2. 26-99
3. 100-499
4. 500-999
5. 1000 or more

3. Plan to buy:
a. Now
b. In 4-6 months
c. In 7-12 months
d. More than 12 months from now
e. For reference only

4. For how many personal computers do you buy products? (Include both company and personal units, please.)
1. 1
2. 2-4
3. 5-9
4. 10 or more

5. How many of the above are Macintoshes?
a. 1
b. 2-4
c. 5-9
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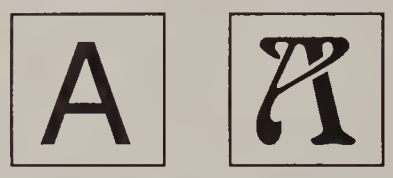

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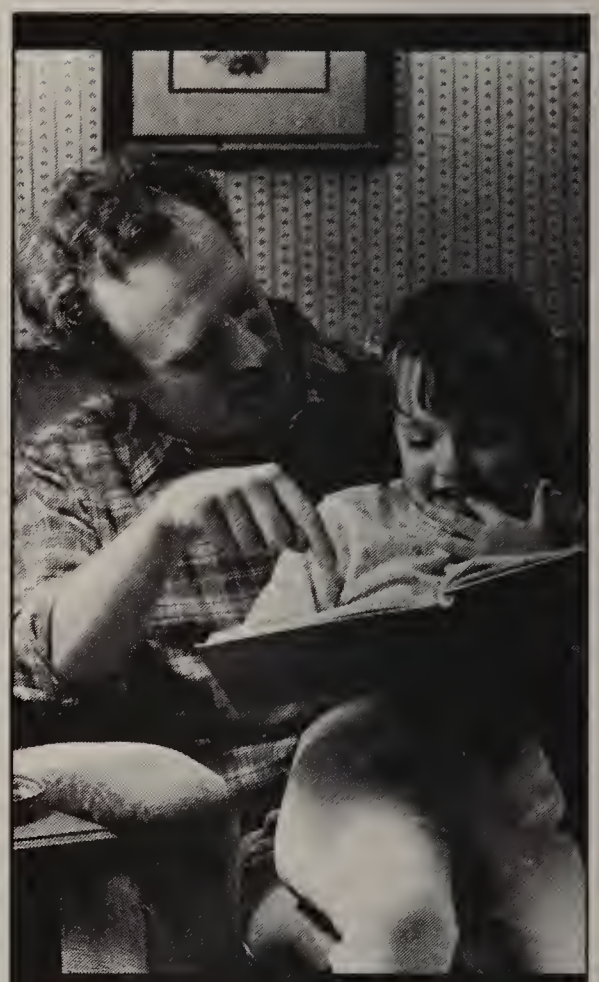

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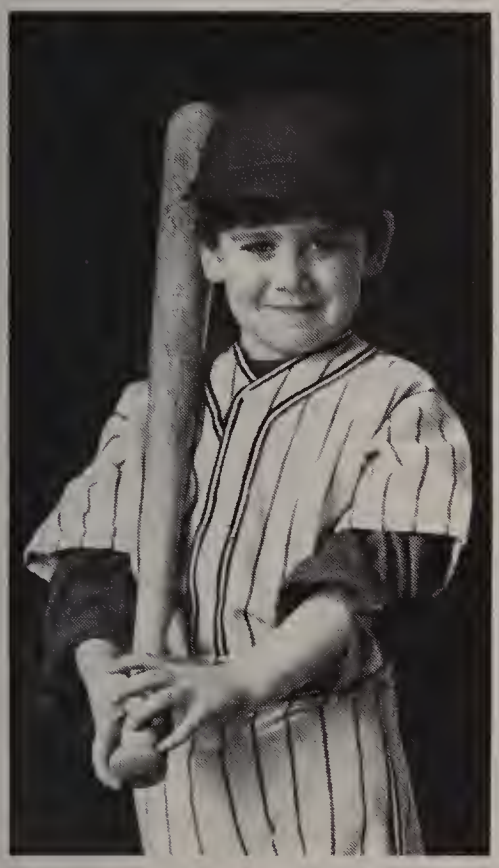

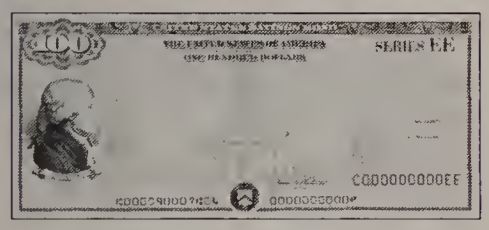

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When MACazine (Jan. 1986) bestowed OverVUE with its **Readers' Choice Award**, they wrote: "We selected OverVUE because of its ease of use, clairvoyance and statistical capabilities. The fact that OverVUE was subsequently selected by our readers as Best Database simply confirms our original assessment: the product is a jewel and the customer support a bonus!"

OverVUE's clean sweep of these two prestigious awards only confirms what everyone else has been saying all along:

Infoworld (July 8, 1985): "...it is Macintosh software done right."

Icon Review (Fall 1985): "OverVUE 2.0 is our favorite database workhorse...it simply offers the best balance of power and ease-of-use available on the market today."

Nibble Mac (Oct. 1985): "OverVUE is not only easy to set up, it's the easiest for data entry. Its tools for entering repetitive data minimizes typing time."

Online Today (electronic version — Nov. 1985): OverVUE 2.0 is a heavy-duty data management tool...It does all the things a good relational database manager should."

OverVUE's features and power make it the ultimate database choice. Clearly, users and editors alike think OverVUE is something special. We think you will, too.

So visit your nearest software dealer and purchase your very own copy of OverVUE, the Best Database of the Year.

Write for information concerning our new Mail Management and Personal Finance Templates.

ProVUE Development Corp.
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Macworld Best-Sellers

Business Software

Months on chart	Last month	This month	
29	1	1	**Microsoft Word** *Microsoft*
9	3	2	**Microsoft Works** *Microsoft*
21	3	3	**Microsoft Excel** *Microsoft*
7	5	4	**SuperPaint** *Silicon Beach Software*
17	4	5	**PageMaker** *Aldus*
2	8	6	**WriteNow for Macintosh** *T/Maker*
2	–	7	**FileMaker Plus** *Nashoba Systems*
2	6	8	**MacMoney** *Survivor Software*
1	–	9	**Reflex for the Mac** *Borland International*
12*	–	10	**MacWrite** *Apple Computer*

Education Software

Months on chart	Last month	This month	
13	2	1	**Math Blaster** *Davidson and Associates*
13	1	2	**KidsTime** *Great Wave Software*
5	4	3	**Early Games** *Springboard Software*
8	–	4	**MasterType** *Mindscape*
11	3	5	**Typing Tutor III** *Simon and Schuster Software*

Entertainment Software

Months on chart	Last month	This month	
9	2	1	**Dark Castle** *Silicon Beach Software*
13	1	2	**Flight Simulator** *Microsoft*
13	3	3	**MacGolf** *Practical Computer Applications*
2	4	4	**Ferrari Grand Prix** *Bullseye Software*
3	–	5	**Déjà Vu** *Mindscape*

Networking/Data Communications

Months on chart	Last month	This month	
9	2	1	**TOPS** *Centram Systems West*
13	1	2	**AppleTalk** *Apple Computer*
5	3	3	**AppleShare** *Apple Computer*
12	4	4	**MacServe** *Infosphere*
2	–	5	**PhoneNet** *Farallon Computing*

Hard Disks

Months on chart	Last month	This month	
9	1	1	**Apple Hard Disk 20/20SC** *Apple Computer*
13	2	2	**DataFrame 20** *SuperMac Technology*
2	3	3	**Macintosh Internal 20SC Hard Disk** *Apple Computer*
8	–	4	**FX-20** *General Computer*
3	–	5	**Rodime 20 Plus** *Rodime Peripheral Systems Division*

Books

Months on chart	Last month	This month	
13	1	1	**Excel in Business** *Douglas Cobb, Microsoft Press*
12	2	2	**Inside Macintosh** *Addison-Wesley*
3	5	3	**MacBook** *Arthur Naiman, Hayden Book Company*
5	–	4	**Creative Programming in Microsoft BASIC** *Steve Lambert, Microsoft Press*
4	–	5	**Microsoft BASIC Book/Macintosh Edition** *Walter A. Ettlin and Gregory Solberg, Osborne/McGraw-Hill*

Product Watch

Editors' choice:
Other recent products of particular interest.

Personal Laser Printer *General Computer* QuickDraw laser printer

PixelPaint *SuperMac Software* color paint program

Translink *Levco* transputer parallel-processing accelerator board for Mac SE and Mac II

Source: Exclusive InfoCorp survey of more than one hundred twenty-five Macintosh retailers and selected mail-order suppliers. Covers sales during July 1987.

** Formerly bundled with the Mac.*

The Word is Out...

"Absolutely AMAZING word processing program. I want it WriteNow!"

Robert Forras, MacTimes

"WriteNow feels perfect.... It's hot. Highly recommended. This is THE word processor to use if you use a Mac."

John Dvorak, San Francisco Examiner

"Right now, WriteNow comes the closest to delivering on the promise of future word processing."

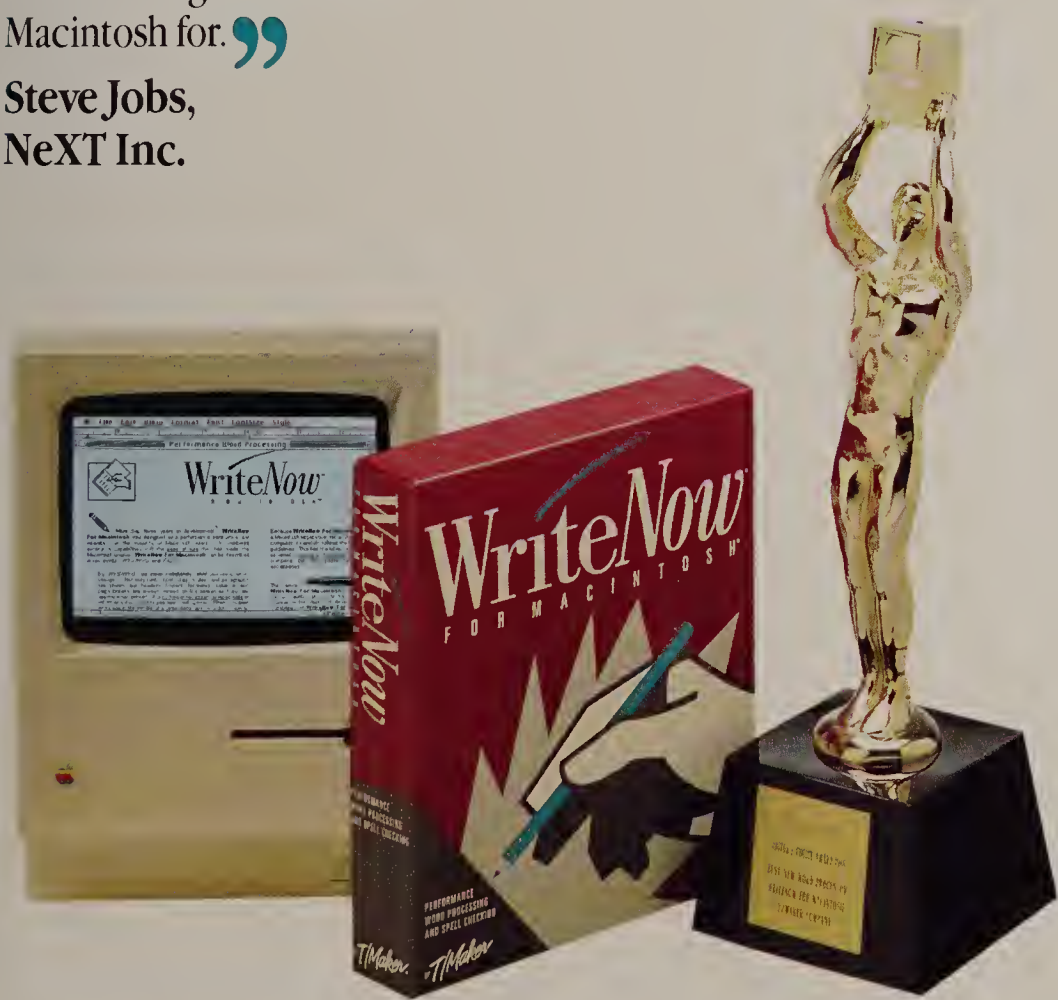
Michael Miller, InfoWorld

"This is the word processor that we designed and built Macintosh for."

Steve Jobs, NeXT Inc.

"T/Maker's WriteNow For Macintosh is a polished word processor that retains the elegance of MacWrite but adds features like multiple windows, footnotes, multiple columns, and a spell checker."

Dan Farber, MacWorld Magazine



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Vicky Jo Varner, The MACazine

Best New Word Processor
MacUser Magazine 1986

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Pagemaker 2.0 now imports & exports WriteNow documents

Macworld World Class Award — Best Input Device

Turbo Mouse™. Twice the speed, in half the space.

Finally, a Mouse that's really quick. One that doesn't require a lot of room on your desk. One that's easy to use, even on a desk full of papers. Turbo Mouse from Kensington.

Turbo Mouse turns mouse technology upside down. It puts the mouse ball on top, rather than on the bottom like a standard mouse. You move only the mouse ball, not the whole mouse. That's why Turbo Mouse is quicker, quieter, and easier to use.

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For Macintosh™, Mac Plus, Apple® IIe, or IIc, ask for model 62350. For Macintosh SE, Mac II, or Apple IIGS, ask for Turbo Mouse ADB, model 62352. For more information, or a dealer near you, call (800) 535-4242. In NY (212) 475-5200.

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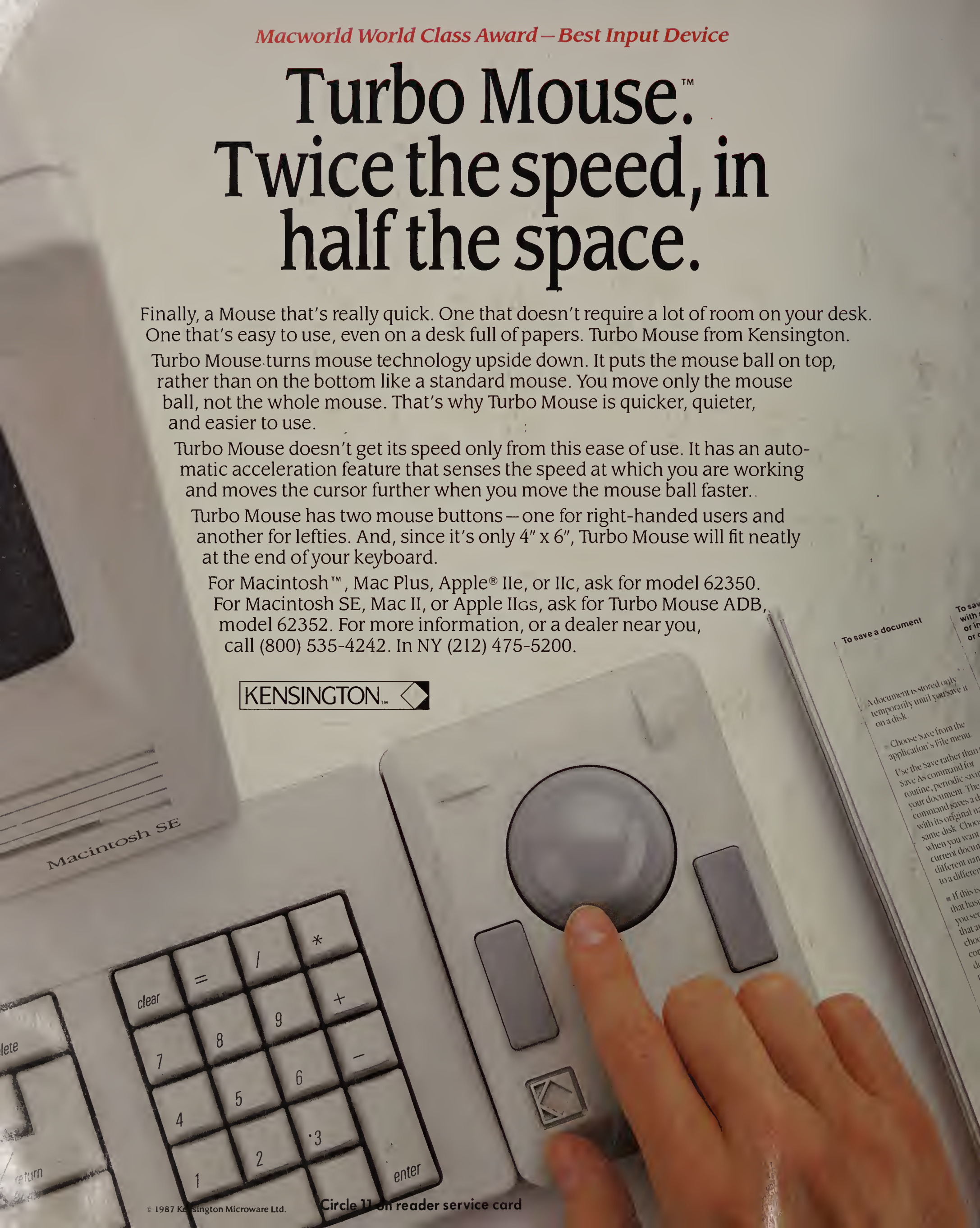

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